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IMPLEMENTATION OF INTERNATIONAL SAFEGUARDS IN THE JAPANESE CONTEXT

by

Linda Daryl Schmitt Gallini

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Political Science)
in The University of Michigan
1975

Doctoral Committee:

Professor Harold K. Jacobson, Chairman
Associate Professor Robert Cole
Associate Professor Lawrence Mohr
Professor Lawrence Scheinman, Cornell University

To the memory of

my Mother

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PREFACE

Much of the material in the study which follows was obtained from interviews conducted in Vienna and Tokyo during the academic year 1973-1974. In most cases, interviews were granted with the understanding that personal opinions and views would remain confidential. Consequently direct quotations utilized in the text of this dissertation are rarely attributed to a specific individual.

Japanese names appear in the text in the Japanese order, namely, surnames first, except where source material dictates otherwise.

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CHAPTER I

THEORETICAL ORIENTATION

The purposes of this study are twofold. On the one hand, the study is intended to provide a case study investigation of a specific contemporary issue--implementation of international safeguards by the International Atomic Energy Agency (IAEA)--within a specific national context--Japan--and the problems and considerations which have arisen as a result of IAEA efforts to develop and implement an internationally acceptable safeguards system. Although the IAEA has been involved with safeguards policy since its inception in the 1950s, and although safeguards policy represents a significant attempt to coordinate international regulation with national control of nuclear material, it has only been in the past few years that the technical and political implications of safeguards policy have begun to be intensely examined in both national and international forums. One indication of the increased importance attached by national governments to the policy of safeguards is seen in the diversity and consistency of nation-state representation and participation in the safeguards committee meetings sponsored by the IAEA in Vienna from June, 1970 - March, 1971.[1] With the on-going

[1]There were eighty two sessions of the committee and "in an average session almost fifty countries would be represented, with a hard core of perhaps thirty-five to forty important countries always there." Henry D. Smyth, "The Need for International Safeguards," in Mason Willrich, ed., International Safeguards and Nuclear Industry (Baltimore, Johns Hopkins University Press, 1973), p. 19.

world-wide increase in the number of nuclear power facilities in operation or under construction, and the tremendous annual increase in the amount of nuclear material available as a result of the operation of these plants,[2] the future of safeguards policy will have increasing significance for all nations.

On the other hand, this study is an attempt to probe more deeply into several areas of concern to students of international organization, including: 1) identification of conditions which may affect the capacity of an international organization to implement the functions assigned to it by its member-states; 2) evaluation of the impact of these conditions on the efforts of an international organization to undertake a specific function, and; 3) speculation about the effects which these conditions may have on the future role and activities of the international organization within the international system. This speculation is based on the belief that the present efforts of an international organization to implement a given task can have direct implications for shaping the future activities and role of the organization in the international system.

In recent decades the international community has experienced both a significant increase in the number of international organizations operative within the international system[3] and a growing awareness of the need for concerted international action to deal with

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[2] Ibid., pp. 58-60.

[3] Robert W. Cox and Harold K. Jacobson, The Anatomy of Influence (New Haven, Yale University Press, 1973), p. 1.

a variety of problem areas of unprecedented complexity and magnitude. Confronted with the unhappy realities of worsening pollution, overpopulation, mass starvation and the ever-present spectre of nuclear warfare, government decision-makers and students of international organization are engaging in an intensifying effort to evaluate the potential of international organizations to provide effective mechanisms for dealing with these and other problems of concern to all nations. As L. H. Miller has noted:

> The process of international organization is of immense interest today because of the magnitude and importance of the issues it confronts, issues involving social progress, the quality of political life, the prevention of war, and the creation of a secure peace. More important however, is the question of how effectively international organization can deal with the problems it assumes.[4]

The attempt by analysts to determine the present effectiveness of international organizations in dealing with complex international problems is accompanied by a corresponding attempt to evaluate the extent to which the present performance of international organizations regarding difficult international problems can serve as an indicator of their future utility in this realm. The question of the role which international organizations could play in the future international community has long been debated and discussed by students of international organizations. Some have argued that international organizations represent the building blocks required for the construction of a legitimate, accepted world government. According to these individuals, the key to lasting international

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[4]Lynn H. Miller, Organizing Mankind (Boston, Holbrook Press, 1972), p. 5.

peace and harmony lies in the gradual transferal of authority on the part of independent sovereign states to a defined group of international organizations in which all states participate and to which all states pledge support and obedience. Other individuals argue, however, that the concept of a world government is unrealistic, at best, and that international organizations represent nothing more than adjuncts to sovereign states, designed to facilitate the ongoing interaction and communication among these states. Still other individuals have asserted that the concept of an inter-governmental international organization is becoming increasingly archaic and will disappear completely in the future.

In conjunction with the efforts of analysts to evaluate both the present capacity of international organizations to deal with complex international problems and to suggest the extent to which the present performance of an international organization may serve as an indicator of the future role of the organization in the international system, we will focus in this study on the efforts of the International Atomic Energy Agency to carry out a function assigned to it by its member-states at the time of its establishment, namely, the development and implementation of international safeguards. More specifically, we will focus on the Agency's efforts to implement international safeguards in the Japanese national context. Our basis concern is: 1) to investigate the nature of the organizational contexts at both an international organization and a national organizational level out of which safeguards policy emerges; 2) to examine the interaction which transpires between the international organization and national organizations regarding

safeguards policy, and; 3) attempt to assess the impact which this interaction has on the present capacity and future potential of the IAEA to implement safeguards policy. We will be interested in attempting to discern the extent to which the IAEA has been successful in establishing and expanding its safeguards coverage in Japan, the extent to which the Agency has maintained direct administration of its safeguards functions in Japan, and the extent to which the Agency's experience in Japan can offer insight into the future course of the Agency's involvement with the policy of safeguards. The concept and policy of international safeguards represents a significant attempt to coordinate international monitoring with national control over nuclear material; thus, it is hoped that examination of the IAEA's experience in developing and implementing safeguards policy in Japan will provide at a minimum some measure of insight into the conditions impinging upon the efforts of an international organization to effect this coordination. Moreover, it is hoped that this study will provide at least some basis for speculation about the future role of the IAEA within the international system.

A number of reasons prompted the selection of Japan as a focal point for this study. Japan has been a member of the IAEA since the Agency was established in 1957. Moreover, Japan was the first member-state to request the Agency to supply nuclear material for research purposes, and consequently, was the first state to submit to international safeguards. The Japanese have played an active role in seeking to shape the contours of international safeguards policy, as we shall see, and much of the Agency's on-going safeguards effort is concerned with Japan. Finally, the decision of the Japanese to accept international safeguards in conjunction with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) has at

least symbolic significance for the IAEA in its attempts to extend safeguards coverage under the NPT to all Non-Nuclear-Weapon States.

Before specifying the conceptual framework underlying this thesis, it may be useful at the outset to clarify the nature of the policy being examined here as well as some of the definitions and theoretical considerations incorporated into this study.

The Policy of Safeguards

Briefly stated, safeguards policy is concerned with detecting, limiting or preventing the diversion of nuclear material from legal peaceful purposes to the illegal production of nuclear explosives.[5] This policy has its origins in both the first resolution on atomic energy adopted by the United Nations General Assembly in January, 1946, and in the so-called Baruch Plan of June, 1946. According to the resolution of the General Assembly, the United Nations Atomic Energy Commission was established, to "'make specific proposals . . . for control of atomic energy to the extent necessary to ensure its use only for peaceful purposes; . . . for effective safeguards by way of inspection and other means to protect complying states against the hazards of violations and evasions.'"[6] The Baruch Plan included a proposal for the adoption of a system of complete international control of nuclear material, and would have transferred all nuclear material to international ownership. Advocation of this plan by

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[5] Smyth, in Willrich, ed., p. 9.

[6] International Control of Atomic Energy, Growth of a Policy, Department of State Publication 2720 (Washington, D. C., 1946), p. 127, as cited by Bernhard G. Bechhoefer, "Historical Evolution of International Safeguards," in Willrich, ed., p. 22.

the United States was officially terminated in 1954 in recognition of prolonged Soviet opposition; the notion of safeguards persisted, however, and after Eisenhower called for the establishment of an international organization to promote the peaceful uses of nuclear energy in his famous "Atoms for Peace" address to the United Nations General Assembly on December 8, 1953, negotiations went forward, in 1954 and 1955, to create an international body that would have at least some safeguard responsibilities. The resolution that was unanimously adopted as the Statute for the International Atomic Energy Agency in October, 1956, included a provision authorizing the Agency:

> 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 way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy.[7]

Thus through the action of eighty-one states, the IAEA was established and assigned the responsibility of performing safeguards functions. The nature of these functions and IAEA efforts regarding these functions will be discussed in Chapter II.[8] Here, however, several characteristics of safeguards policy should be noted.

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[7] IAEA Statute, as amended up to June 1, 1973, Article III.A.5 See also Article XII for an elaboration of the Agency's rights and responsibilities concerning safeguards.

[8] See Bechhoefer, in Willrich, ed., pp. 21-44, for a detailed discussion of the initiation of safeguards policy and the establishment of the IAEA.

As stated above, the articulation of the concept of safeguards and the assignment of safeguard responsibilities to an international organization includes the notion of supplementing national control over nuclear material with international regulation. In an international system composed of independent sovereign states, the prospects for the successful implementation of such a policy might be regarded as shaky, at best. Nonetheless, safeguards policy has been identified by a number of authorities as a significant effort to expand international control at the expense of traditional state sovereignty.[9] Moreover, safeguards policy involves complex technical considerations as well as thorny political implications. Delineation of safeguards involves, as we shall see, specification of technical procedures for each stage of the nuclear fuel cycle. Despite the efforts of many scientists to develop and improve these procedures, safeguards technology in several areas remains underdeveloped. Consequently,

> we find political scientists who appreciate the political significance of international safeguards but who would leave the actual implementation to 'the experts,' on the assumption that appropriate technical means must exist of supervising a country's nuclear industry and of making sure that nothing illicit occurs. Technical experts, on the other hand, maintain that there is no fool-proof way of detecting diversion.[10]

Thus, objections to international safeguards by national governments can result from technical problems as well as political motives.

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[9]See, for example, Smyth, in Willrich, ed., p. 17

[10]Ryukichi Imai, Nuclear Safeguards, Adelphi Papers, no. 86 (London, The International Institute for Strategic Studies, 1972), p. 2.

Finally it should be noted that the IAEA is actually involved in two categories of safeguards, namely, safeguards agreements related to the Treaty on the Non-Proliferation of Nuclear Weapons and safeguards agreements which have been concluded without reference to the NPT. The differences between these two types of agreements will become more apparent as we proceed.

Definitions

The term international organization will refer here to those intergovernmental organizations which "possess institutional structures (typically) based on treaties which bind together several or many nation-states in long-term agreements designed to foster cooperation with each other, in specified ways, and for the promotion of general or particular political and/or social goals."[11] A national organization is defined as an organization established within the boundaries of a single state by the citizens of that state for the purpose of pursuing goals articulated by its founders or members. A national organization may be anything from a governmental organization to a charitable organization. It may include on its staff citizens from other nations, but these people comprise a small minority of the total staff. Whatever assets are possessed by the organization are controlled by a national government or by citizens of the government. Interaction between organizations--either between international and national organizations or between national organizations--can take a variety of forms: written communication,

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[11]Miller, p. 5.

exchange of delegations or staff members, formal negotiations, informal talks in hallways, coffee shops or cocktail lounges, clandestine encounters, market competition, and the like. Moreover interaction can be categorized in various ways: routine, non-routine, crisis, formal, informal, direct, indirect, friendly, hostile, cooperative, uncooperative, minimal, frequent, etc. The attempt will be made here to study all manifest interaction between the IAEA and Japanese national organizations regarding safeguards in the hope of identifying patterns in this interaction and suggesting the extent to which this interaction affects the capacity of the IAEA to implement safeguards policy in Japan.

Theoretical Orientation

Of the various theoretical concepts and assumptions underlying this study perhaps the most significant in determining the nature of the conceptual framework utilized here is the concept of an organization as an open system. All organizations, whether international or national are regarded in this study as

> open systems, with their activities organized around the operative goals that have developed during the course of the organization's life. This open system involves inputs from the environment, interpersonal interactions, individual actions, and the effects of the existing organizational structure. The organization engages in activities and contains processes that alter the organization and affect its output. This output in turn affects and is reacted to by the environment.[12]

Conceptualization of an organization as an open system

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[12]Richard H. Hall, Organizations: Structure and Process (New Jersey, Prentice-Hall, 1972), p. 346.

necessitates consideration of both the external environment of the organization as well as its internal characteristics; thus, this thesis begins with the premise that any attempt to study and evaluate the capacity of an international organization to carry out its designated functions must begin with an understanding of the constraints placed upon it both by its external environment and by the internal characteristics of its structure and modus operandi. Primary emphasis will be placed in this study upon the examination of internal organizational characteristics as determinants of organizational behavior; this examination will be based upon concepts developed in the realms of organization theory and social psychology. Depite this emphasis however, the importance of external environmental considerations such as those identified and analyzed by students of world politics should be emphasized. Therefore, before specifying the conceptual framework underlying this study, it is necessary to attempt to delineate both the nature of the constraints imposed upon the IAEA by its external environment and to review some of the concepts developed in organization theory literature and social psychology which form the basis of the conceptual framework that will be utilized here.

While the omnipresent constraints placed upon IAEA operations by its external environment will be regarded as a constant in this study, it is nonetheless essential to emphasize the underlying influence of these forces which constitute fundamental limitations on Agency activity.

International Organizations and the Environment

Much has been written by students of international organization regarding the effects which the broad environment in which these organizations must operate can have on the capacity of the organizations to carry out their functions. Stanley Hoffman has noted that

> it has become clear that international institutions, in their political processes and in their functions, reflect and to some extent magnify or modify the dominant features of the international system. Therefore, instead of concentrating on these institutions as if they were a closed universe, one ought to study them as patterns of cooperation and of muted conflict whose nature, evolution, effectiveness, and outcomes cannot be studied apart from the global system or from the relevant subsystem.[13]

Cox and Jacobson draw a useful distinction between the general and specific environments of an international organization.

> To understand international organizations we must devise a framework that will make the decisions and actions taken through them intelligible in the context of events where they originate and which they may affect. International organizations are thought of in this study as systems that are not fully autonomous, but rather are subject to environmental forces that become major constraints upon and determinants of decisions . . . The environment can be considered to comprise a number of variables; some are common to all international organizations, and some are confined to particular organizations. . . We conceive the general environment in terms of states, their characteristics, and their broad policies . . . The environment specific to an international organization may be either linked with or independent of the general environment. In most instances there is probably some relationship, but its strength will vary with different fields.[14]

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[13]Stanley Hoffman, "International Organization and the International System," International Organization 24 (Summer 1970): 389-390.

[14]Cox and Jacobson, pp. 25-34.

What Cox and Jacobson term the general environment has been referred to by others as the international system.[15] The two terms will be used interchangeably here.

Advocates of an open-system orientation are fond of arguing that no organization exists and operates in a vacuum. This is particularly true of an international organization.

> The international status quo is the system of nation-states wherein there continues to exist a constant struggle for power. Since international organization is a mechanism designed to encourage a better functioning of the state system, it must, of necessity, contend with this ceaseless struggle and the forces which shape it . . . What must be examined, then, are the forces underlying the state system if there is to be an understanding of the difficulties confronting the development, function, and successful operation of an international organization.[16]

Many authors have provided varying analyses of the characteristics of the international system of nation-states which seem to influence the ability of international organizations to carry out their functions. The bulk of these characteristics fall into four categories: 1) the structure of the international system;[17] 2) the

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[15] J. David Singer, "The Level-of-Analysis Problem in International Relations," in James N. Rosenau, ed., International Politics and Foreign Policy (New York, The Free Press, 1969), p. 22.

[16] Stephen S. Goodspeed, The Nature and Function of International Organization (New York, Oxford University Press, 1967), p. 9.

[17] See, for example, Morton A. Kaplan, System and Process in International Politics (New York, John Wiley & Sons, Inc., 1957). Also, Kenneth N. Waltz, "International Structure, National Force, and the Balance of World Power, in Rosenau, ed., pp. 304-314. Also Karl W. Deutsch and J. David Singer, "Multi-polar Power Systems and International Stability," World Politics 16 (April 1964): 390-406. Also, Richard N. Rosecrance, "Bipolarity, Multipolarity and the Future," in Rosenau, ed., pp. 325-335. Also, James E. Dougherty and Robert L. Pfaltzgraff, Jr., Contending Theories of International Relations (New York, J. B. Lippincott Company, 1971), pp. 102-137.

level of conflict within the international system;[18] 3) the nature of the nation-state as an actor in the international system,[19] and; 4) the impact of technology on the international system and the changing needs of the system.[20] To varying degrees each of these characteristics has had a continuous impact on the IAEA and its ability to implement policy.

The international system into which the IAEA was introduced in the late 1950s was regarded by most analysts as a fundamentally bipolar system, dominated by the activities of the two superpowers, the Soviet Union and the United States. Since its inception, the Agency has received consistent support from the United States; as Scheinman has observed,

> With the American nuclear monopoly broken, the erosion of secrecy already under way, and the promise that the peaceful atom would become more reality than myth and that the dispersion of nuclear technology and facilities would be the tide of the future, the United States sought to channel this development and manage its implications through an institutional forum. The agency properly may be viewed, therefore, at least at its inception, as an expression of political policy by the United States, in which others joined.[21]

The impact of the on-going support of the United States on the

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[18]See, for example, Philip E. Jacob and Alexine L. Atherton, The Dynamics of International Organization (Homewood, Ill., The Dorsey Press, 1965), p. 40.

[19]See Goodspeed, pp. 10-11.

[20]See, for example, Philippe de Seynes, "Prospects for a Future Whole World," International Organization 26 (Winter 1972): 1-17.

[21]Lawrence Scheinman, "IAEA: Atomic Condominium?" in Cox and Jacobson, p. 217.

functioning of the Agency cannot be overemphasized; while this support has guaranteed the continued viability of the organization, particularly during its early years when events conspired to minimize its utility,[22] it has also served to guarantee the continued dominance of United States influence in the formulation and implementation of Agency programs. It should be noted however, that the apparent trend of the international system toward a multipolar distribution of power which analysts in recent years have attributed in part to the increasing ascendancy of the People's Republic of China as well as to the increased influence of underdeveloped but resource-rich third world nations is being reflected to some degree in the gradual expansion of Agency membership to include an increasing number of non-aligned or third world nations. The effect which this change in the number and composition of Agency membership could have on Agency policies and the underlying influence of the United States on these policies is as yet unclear, but could prove to be considerable. What does seem clear, however, is the susceptibility of the Agency to the pressures resulting from gradual changes in the structure of the international system.

A second characteristic of the international system which has a discernable impact on the capacity of the Agency to carry out its functions is the level of conflict within the system. As Hoffman has noted:

> Since international organizations provide procedures for cooperation or for the temperate pursuit of conflict, it is obvious that their

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[22] See Ibid., pp. 222-224.

> effectiveness depends on the degree of moderation of the international system. A revolutionary system wracked by inexpiable power rivalries and ideological conflicts is one in which international organization is reduced to impotence as a force of its own and to the condition of a helpless stake in the competition of states.[23]

While the IAEA has yet to deal with the intricacies of a revolutionary international system, the complications which have confronted the Agency resulting from the on-going rivalry of the superpowers, the only recently modified policy of excluding the People's Republic of China from international forums, and the numerous relatively small-scale wars which have erupted during the Agency's life-time are far from inconsiderably. Although the basically technical nature of the Agency has generally enabled it to avoid the kinds of stormy political sessions which have surfaced from time to time in other international forums, particularly the United Nations, various aspects of the Agency such as the composition of its staff, generally dominated by Americans and to a lesser degree West Europeans, the membership of the organization as a whole, which does not include the People's Republic of China and only recently has begun to attract third world nations, and the budget of the Agency, which has been substantially subsidized in the past by the United States, all subtly reflect the political divisions and conflicts which characterize the international system in which the Agency pursues its affairs.

Of the four categories of characteristics of the international system cited above as influential in determining the capacity of

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[23]Hoffman, p. 390.

international organizations to implement their various policies, perhaps the most stable over time has been the nature of the nation-state as an actor in the international system. During the years of its existence, the IAEA has witnessed no startling transformation in the nature of the nation-states the coordinated interaction of which led to its establishment and which today comprise its membership. Indeed, there has been little discernable modification in the doctrine of state sovereignty and equality since its first articulation centuries ago, and this doctrine represents a major constraint on and determinant of the functions of all international organizations, including the Agency. Nation-states continue to be the founders as well as the members of international organizations; the goals of international organizations are defined by nation-states as are the acceptable parameters for international organizational activity. Perhaps the most significant constraint placed upon international organizations by their nation-state members however results from the retention of control by states over all tangible resources of these organizations. Control of the purse combined with the potential to withhold skilled personnel and other resources essential to policy implementation by international organizations constitutes the major means whereby nation-states maintain command of the international organizations they create.

A final feature of the international system influencing the effective extent of international organizational functioning including that of the IAEA has been the focus of ever-increasing attention by scholars and policy makers alike in the past few years. Although the implications of technological demands and developments

on the international system have yet to be fully assessed, it has become clear that these demands and developments comprise an increasingly significant influence on the nature of international interaction and organization. Scientific and non-scientific scholarly journals and publications both reflect a world-wide recognition of

> the ambivalence of technology, its negative effects on the degradation of the environment, the destruction of ecological balances, the limited capacity of the biosphere, the possible depletion of natural resources, the population explosion, the finiteness of the planet and perhaps even the finiteness of knowledge. [24]

Concern about the effects of technology on the quality of life on earth in coming decades has been heightened by publications such as Limits to Growth.[25] While few analysts question the gravity of the negative aspects of technological development for the future quality of human life, there is little consensus to date regarding the most effective methods for dealing with the undesirable or harmful qualities of technological innovation. Moreover, scholars are just beginning to relate the need for controls on technological development to the capacities of various types of political systems and to assess the political implications of policies concerning technology. Whether the expansion of political control over technological development will have a positive effect on the capacity of international organizations such as the IAEA to carry out an

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[24] deSeynes, pp. 1-2.

[25] Donella H. Meadows and Dennis L. Meadows, et. al., Limits to Growth (New York, Signet, 1972).

expanded set of functions as some predict,[26] or whether international organizations will become increasingly ineffective in the face of the challenge presented by technological development remains unclear. What is clear, however, is the magnitude of the threat presented by unregulated technological change and development, and the growing need for the establishment of effective mechanisms of international control over these developments.

International Organizations: Internal Constraints

On the other side of the fence from those students of international organization who look to variables in the external environment to explain the major forces and constraints which impinge upon the operation and effectiveness of international organizations are those who focus on the internal characteristics of these organizations as the primary determinants of organizational behavior. While practitioners of this approach have identified a number of these characteristics, emphasis has been placed primarily on: 1) structural characteristics; 2) decision-making techniques; 3) organizational goals, and; 4) motivations, perceptions and socialization of organizational personnel. In addition to these variables, factors such as the past history of the organization, statutory provisions and legal foundations of the organization have also been analyzed. Those analysts concerned primarily with demonstrating a linkage between organizational structure, decision-making techniques or pursuit of organizational goals and

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[26] de Seynes, pp. 16-17.

organizational behavior tend to utilize the concepts and propositions being developed in the realm of organization theory literature: analysts attempting to link the attributes of organizational personnel with organizational behavior tend to adopt a social-psychological orientation. Many of the concepts developed by writers in these realms are incorporated into the conceptual framework which underlies this study; consequently it may be useful to review the origins of these concepts prior to specifying the contours of the framework.

Organizational Structure

One of the earliest attempts to link organizational structure with organizational behavior was by Max Weber.[27] In what is now regarded as a classic in the realm of organization theory literature, Weber sought to identify the main characteristics of a bureaucratic type of organization and thereby provide "a conceptual tool which helps us to understand better social phenomena, by analyzing the discrepancy between their ideal form and their concrete state."[28]

Weber's writings gave rise to a group identified as "structural theorists" in whose writings

> regularities in such activities as task allocation, the exercise of authority and coordination of function are developed. Such regularities constitute the organization's structure, and sociologists have studied systematic differences in structure related

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[27]Max Weber, "The Essentials of Bureaucratic Organization: An Ideal Type Construction," in Robert K. Merton, ed., Reader in Bureaucracy (Glencoe, Ill., Free Press, 1952), pp. 18-27.

[28]Nicos P. Mouzelis, Organization and Bureaucracy (Chicago, Aldine Publishing Company, 1967), p. 48. See also, pp. 38-54.

> to variations in such factors as the objectives of ownership, geographical location, and technology of manufacture, which produce the characteristic differences in structure of a bank, a hospital, a mass production factory or a local government department.[29]

Weber's writings also gave rise to critics who attacked the limitations of analyzing organizational structure solely on the basis of Weber's bureaucratic model and went on to explore alternative means of analyzing organizational structure in regard to such things as environmental, technological or other internal considerations.[30]

Despite differences in approach to the study of organizational structure, few students of organization theory challenge the necessity of incorporating consideration of this factor into any attempt to assess organizational behavior. It is generally acknowledged that "structure is a fact in any organization and is the point from which analyses of most facets of organizational life must begin."[31] This realization has resulted in an ever-increasing volume of publications by students of organization theory who seek to examine the impact of structural variables such as size, complexity and formalization on the way in which

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[29]Derek S. Pugh, "Modern Organization Theory: A Psychological and Sociological Study," Psychological Bulletin 66 (October 1966): 235-51, as cited in Hall, p. 29.

[30]See Paul R. Lawrence and Jay W. Lorsch, Organization and Environment (Homewood, Ill., R. D. Irwin, 1969), and Tom Burns and G. M. Stalker, The Management of Innovation (London, Tavistock Publications, 1966).

[31]Hall, p. 105.

organizations function.[32] Our purpose here is not to review this literature but merely to emphasize that these writings have clearly demonstrated that "structural characteristics have important relationships with other major organizational features such as rate of change, the distribution of power within the organization, and relationships with the environment."[33]

Decision-Making Techniques

Since World War II a great deal of effort has been devoted to the study of decisions as a key element in the policial process. This effort has been exerted in a number of directions: some writers have sought to challenge or reassert the validity of the traditional assumption of rationality,[34] while others have tried to provide a comprehensive checklist of the variables which should be considered in any attempt to analyze policy-making.[35] Still

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[32]The volume of literature in this realm is enormous. See Ibid., pp. 105-199, for a review of some of this literature and for additional references.

[33]Ibid., p. 197.

[34]See, for example, Joseph Frankel, The Making of Foreign Policy: An Analysis of Decision-Making (New York, Oxford University Press, 1963), pp. 166-175. See also Graham T. Allison, Essence of Decision (Boston, Little, Brown & Company, 1971). Also Herbert A. Simon, Administrative Behavior (New York, Macmillan Company, 1959), for Simon's development of his concepts of "bounded rationality" and "satisficing."

[35]See Richard C. Snyder, H. W. Bruck and Burton Sapin, "The Decision-Making Approach to the Study of International Politics," in Rosenau, ed., pp. 199-206. See also Richard C. Snyder, H. W. Bruck, and Burton Sapin, eds., Foreign Policy Decision-Making (New York, Free Press of Glencoe, 1963).

others have sought to provide alternative models of decision-making[36] or to utilize the study of decision-making as a means of examining processes internal to organizations such as the changing patterns of influence.[37]

Again, our purpose here is not to provide a comprehensive review of this enormous volume of literature; rather, it is to emphasize the utility of decision-making analysis as a means of discerning the conditions and constraints within which an international organization must operate. Perhaps more than any other type of analysis, the study of decision-making, while focusing primarily on internal characteristics of the organization, nevertheless permits a linkage between the internal and external setting of the decision situation.

> Decision-making theory may be considered more appropriately as a form of micro analysis rather than macro analysis. Its central focus is upon something much smaller than the whole political system, viz., upon a relatively limited and well-defined decisional unit. This marks a significant shift from traditional political analysis, in which writers on international politics have been prone to reify or personify nation-states as the basic actors within the international system . . . Decision-making theory directs attention not to states as metaphysical abstractions or to governments or even to such broadly labeled institutions as "the Executive," but instead seeks to highlight the behavior of the human decision-makers who shape governmental policy . . . The decision-maker makes his decisions within a total perceived environment which includes the salient features of his national political system and of the international system as a whole. Thus decision-making theory is linked to systems theory, and the micro

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[36] See Allison, passim.

[37] Cox and Jacobson, passim.

> is joined to the macro, through the perceptions of the decision-maker, who presumably is aware of his existence at various concentric systemic levels.[38]

In addition to serving as a linkage mechanism between macro systemic and micro internal considerations, decision-making analysis can also be regarded as a means of linking structural analysis, studies of organizational goals, and studies at the level of the single individual, for decision-making analysis includes components of all of these forms of analysis. For example,

> Decision-making occurs in an organizational or institutional context which imposes limitations upon the process, and which is shaped by the basic constitutional structure of the system or what we might regard as the formal aspect of the internal setting . . . The decision-making process, then, is a function of organizational structure; the action or behavior of the system is intimately related to its form.[39]

Thus, decision-making occurs within a formal framework imposed by organizational structure and in turn constrains individuals within the organization, who are pursuing some presumably goal oriented course of activity on the basis of their personal socialization, perceptions and misperceptions.

Organizational Goals

There has been a great deal of controversy among students of organization theory regarding the concept of organizational goal. Some have claimed that there is no such thing as an organizational goal but that organizations act as if they had goals. Others have asserted

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[38] Dougherty and Pfaltzgraff, Jr., pp. 315-316.

[39] Ibid., p. 323.

that it is impossible to differentiate organizational goals from the goals of the individuals who are members of the organization (assuming one can agree on who comprises the membership of an organization--another point of controversy). Still others have noted the difficulties of differentiating the concept of organizational goal from that of organizational function.[40]

Out of the miscellaneous mutterings about concepts such as "multiple goal sets," official vs. operative goals," and "goal displacement" has emerged little consensus. Yet it seems likely that if the notion of organizational goal did not exist, it would have to be created:

> The goal concept . . . is vital in organizational analysis. The dynamics of goal setting and goal change do not alter the fact that goals still serve as guides for what happens in an organization. If the concept of goals is not used, organizational behavior becomes a random occurence, subject to whatever pressures and forces exist at any point in time. Since organizations have continuity and do accomplish things, the notion of goals as abstractions around which behavior is organized remains viable.[41]

The concept of organizational goal is particularly relevant to the study of international organization for intergovernmental international organizations are frequently defined, as we have noted, as "institutional structures based on treaties which bind together several or many nation-states in long-term agreements designed to foster cooperation with each other, in specified ways, and for the

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[40]See Hall, pp. 79-103. See also Lawrence B. Mohr, "The Concept of Organizational Goal," American Political Science Review 67 (June 1973): 470-481.

[41]Hall, p. 95.

promotion of general or particular political and/or social goals."[42] Regardless of the nature of the organization being studied however, the concept of organizational goal represents an important tool in organizational analysis; despite the confusion which seems to characterize the literature dealing with this concept, the utility of the concept in the study of organizations should not be underrated.

Motivations, Perceptions and Socialization of Organizational Personnel

The role of the individual within a given organization and the effects which an individual can have on the behavior of an organization represents a fourth area of investigation which has attracted a great deal of attention on the part of many writers. Among the first to recognize the necessity for analyzing the psychological and socio-psychological characteristics of organizational members in relation to organizational behavior were followers of the so-called human relations school. In contrast to the tendency of disciples of Weber and members of the scientific management school of thought to treat individuals as passive instruments to be manipulated for organizational purposes,[43] writers in the human relations field sought to examine the role of the individual within an organization and analyze the impact of the organizational environment on individual attitudes and behavior.[44] In what is regarded as a classic

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[42] Miller, p. 5.

[43] See Mouzelis, pp. 79-96, for a review of the principles of scientific management.

[44] Ibid., pp. 97-119.

in organization theory literature,[45] James G. March and Herbert A. Simon go beyond the tendency of the human relations writers to focus primarily on individual attitudes and motivations in relation to organizational properties such as leadership and supervision, and focus on the cognitive attributes of an individual as an actor within an organization.

> March and Simon note that an individual must be motivated to participate and produce in the organizational setting. The individual is confronted with a series of action alternatives that he could pursue. Each of these alternatives has consequences for the individual, and the consequences in turn are valued differentially by him. These values are affected by the identification patterns of the individual. For instance, he can identify with his own work group, which may or may not have values that coincide with those of the organization . . . At the same time, the individual has external sources of identification, such as his family, union, or professional organization . . . The organization member can also identify with the organization itself . . . March and Simon also point out that there are limits to the individual's cognitive abilities, thus restricting the extent to which he can make rational decisions in or out of the organizational context. March and Simon propose that decisions are satisficing, rather than optimal. That is, given the limitations of the human being, even if he is assisted by computers, the decisions that are made in an organization are not as optimal as they would be if humans had access to, and the ability to interpret, all relevant information before making a decision.[46]

Since the appearance of Organizations in 1958, many other authors have turned their attention to analyzing the individual within an organization. Much of this analysis has focused either on the

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[45]James G. March and Herbert A. Simon, Organizations (New York, John Wiley & Sons, 1958).

[46]Hall, pp. 20-21.

problem of distinguishing between attributes of the individual versus the attributes of the role filled by the individual, or on the difficulties of differentiating between behavior determined by the individual himself and behavior determined by organizational factors. Other studies have contrasted or compared the societal socialization of the individual with his socialization experience as a member of an organization. Still other writings have portrayed the individual as a bureaucratic bargainer engaged in a political game that is played according to unwritten but well-known rules.[47]

As is true of so many other areas, writers who have devoted their attention to the analysis of the individual within an organization and the impact of the individual on organizational activity have yet to come to substantive agreement regarding the findings yielded by their efforts. Nevertheless, there is considerable support for the notion that individuals do have significant impact on organizational activity, and we shall return to examine this idea more closely in subsequent chapters.

Conceptual Framework

At the outset it was stated that this study has a dual purpose: first, to provide an analysis of the problems and prospects for implementation of international safeguards by the International Atomic Energy Agency in Japan, and second, to probe more deeply into the nature and impact of some of the conditions which may affect the capacity of an international organization to carry out its

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[47]See, for example, Allison, pp. 162-181.

designated functions, and which may be instrumental in shaping the future role of the organization within the international system. Our intent, as noted above, is to examine the interaction transpiring between one specific international organization--the International Atomic Energy Agency--and one specific nation--Japan--regarding the attempts of the IAEA to carry out its safeguarding functions, and to attempt to discern the impact of organizational interaction on the capacity of the Agency to implement this policy. The chapters which follow are based on three simple assumptions:

I. The future role of an international organization within the international system is a function of its present ability to implement specific policies within various national contexts.

II. The ability of an international organization to implement a specific policy within a specific national context is a function of the nature of the interaction between the international organization and national organizations regarding the policy.

III. The nature of the interaction between the international organization and the national organizations regarding the policy is a function of: 1) organizational structure; 2) organizational techniques of decision-making, and; 3) organizational personnel.

As is evident, these assumptions are based on the analyses reviewed above which link particular internal or external variables with organizational behavior. Analysts have identified a number of factors both in the macrocosmic systemic environment of an international organization and inherent in the internal condition of the organization which impinge upon the operation of the organization and have the potential to affect the capacity of the organization

to carry out its functions. Here it is suggested that the interaction which occurs between the bureaucracy of the international organization and that of various national organizations is a significant determinant of the degree to which the international organization can successfully implement a given policy or carry out a given function. It is also suggested that the nature of this interaction is determined, at least in part, by the structural characteristics of the organizations involved, their decision-making techniques, and their personnel, all of which must be considered within the context of organizational goals.

The pursuit of organizational goals is assumed here to be a major motivation for organizational action. Moreover it is assumed that organizations seek to survive and to pursue multiple goals on the basis of bounded rationality--that is, the fullest attainment of goals possible on the basis of incomplete information and the least expenditure of resources. The implementation of international safeguards policy--the application or continued application of safeguards procedures by the IAEA within a nation-state--is presumed here to be a goal of the IAEA. It is further presumed that the actions of the Japanese organizations studied here are influenced by a variety of goals, some of which will be examined in Chapter III. Given these assumptions, primary emphasis will be placed here on the study of organizational structure, decision-making, and personnel, with the underlying framework of organizational goals presumed to be an on-going constant in determining organizational behavior.

We are interested in discovering the extent to which structural variables, decision-making techniques and organizational personnel

affect the nature of interaction between the IAEA and specific Japanese organizations and the extent to which this interaction affects the capacity of the IAEA to implement safeguards policy in Japan. Thus we begin by specifying the kinds of effects which we expect structural variables, decision-making techniques and organizational personnel to have on the nature of the interaction between the IAEA and Japanese organizations regarding safeguards policy. We must then specify the ways in which we expect this interaction to affect the implementation of safeguards policy in Japan and our expectations regarding the impact of safeguards policy implementation on the future of the IAEA.

Organizational Structure

As previously noted, many students of organization theory have sought to analyze organizational behavior vis-a-vis structural characteristics. Consideration of structural variables is an essential first step in any attempt to investigate organizational interaction, for such consideration provides the foundation for subsequent analysis.

As a minimum, structural analysis in this study provides us with an obvious means of identifying the subunits of the organization and generally the individuals who will engage in interaction. More importantly, structural analysis should provide one indication of the degree of receptivity of national organizations to interaction with an international organization. That is, structure determines both the identity and the location of the national organizational subunits with which the international organization must deal. Structural analysis provides answers to a variety of

questions regarding variables which could affect the nature of international-national organizational interaction, including: How many subunits must the international organization deal with? How large are these units? What is the scope of these units--that is, what percentage of their total organization do they encompass? How diversified are these units? How clustered are these units geographically? Moreover, by locating the national organizational subunits with which the international organization must deal within the total organization, structural analysis offers insight into the importance of these units vis-a-vis the total organizational structure, as well as indicating the communications networks of these units on both an intra- and inter-organizational basis, and the complexity of the national subsystem with which the international organization must deal.

We expect then that structural analysis will provide us with one means of discerning the size and complexity of the network of national organizations with which the IAEA must interact, as well as the identity and accessibility of this network to the staff of the IAEA. Moreover, structural analysis permits us to explore tentative answers to questions such as: Is there any correlation between change and continuity in national organizational structure with change and continuity in the nature of the interaction between the IAEA and Japanese organizations regarding safeguards? Is there any evidence to suggest that interaction is more stable and consistent when the IAEA is dealing with one national organization (or subunit of the organization) rather than a variety of organizations (or subunits)? How does the accessibility of national

organizations to interaction with the IAEA affect the nature of this interaction?

Organizational Decision-Making Techniques

In addition to providing a variety of insights into the structural context of interaction between an international organization and national organizations, structural analysis serves to set the stage for subsequent analysis of decision-making techniques and the study of organizational personnel, for, as we have noted, "The decision-making process . . . is a function of organizational structure; the action or behavior of the system is intimately related to its form."[48]

There is incorporated into some of the literature in the realm of organization theory an on-going debate between those who assert that individuals can and do play major roles in determining organizational behavior, and those who argue that a change in names and faces within the organization has no impact on organizational activity. This debate has prompted the articulation of two separate models of organizational decision-making, one emphasizing organizational processes and the other political, bureaucratic bargaining among identifiable actors within the organization. While several authors have utilized some variation of the organizational processes decision-making model in their work, the clearest specification of the model to date has been provided by Graham T. Allison. Building on concepts previously developed by writers such as Richard Snyder, H. W. Bruck, Burton Sapin, James March, Herbert Simon, John Crecine,

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[48]Dougherty and Pfaltzgraff, Jr., p. 323.

and others, Allison has elaborated the organizational processes model which explains government behavior as the output of various large organizations that manifest specific characteristics including:

a) problem solving through factoring and fractionated power

b) parochial priorities and perceptions

c) sequential attention to goals which serve as a set of constraints defining the acceptable level of performance by the organization

d) performance of tasks according to standard operating procedures (SOPs)

e) defined programs and repertoires of organizational action

f) uncertainty avoidance

g) problem-directed search

h) incremental organizational change and learning[49]

What emerges from Allison's specifications is a model of organizational behavior and interaction in which each organization pursues, on the basis of established operating procedures and bounded rationality, its own parochially defined programs and goals in competition with other organizations. Problems are solved sequentially and on the basis of limited search for satisficing solutions; when possible, policies with uncertain outcomes are avoided.

Allison's organizational processes model provides both the opportunity to study safeguards policy as organizational output, and

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[49]See Allison, pp. 67-100, for a more detailed elaboration of this model.

to study the interaction between the IAEA and Japanese organizations regarding safeguards as the result of organizational processes. Allison notes that utilization of the organizational process model of decision-making may enhance the capacity of the analyst to explain policy outputs:

> If a nation performs an action of a certain type today, its organizational components must yesterday have been performing (or have had established routines for performing) an action only marginally different from today's action. At any specfic point in time, t, a government consists of an established conglomerate of organizations, each with existing goals, programs and repertoires. The characteristics of a government's action in any instance follows from those established routines, and from the choice made by government leaders--on the basis of information and estimates provided by existing routines--among established programs. The best explanation of an organization's behavior at t is t- 1; the best prediction of what will happen at t + 1 is t.[50]

Thus, the organizational processes model enables us to analyze safeguards policy as organizational output, and attempt to explain the evolution of this policy according to the nature of organizational processes. The model establishes for us a set of expectations regarding the nature of the policy that would be formulated: policy emerging from an organizational process decision-making context should be consistent, stable and show little change in content over time. Once an organization's position regarding safeguards is established, its safeguards policy over time should be predictable and persistent. Innovation would be notable in its absence. Negotiations among organizations regarding safeguards

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[50] Ibid., pp. 87-88.

should be characterized by continuity of the organizations involved and of their individual safeguards policies, as well as a bureaucratic time lag in communication of suggested policy changes or adaptations.

Analyzing safeguards policy as the output of organizational processes of decision-making also establishes a set of expectations regarding the nature of the interaction that would occur between an international organization and national organizations regarding this policy. If policy is the product of organizational processes, interaction should be consistent in its degree of conflict or co-operation, in its modes of contact and communication, and in its frequency, duration and degree of routinization. There should be few surprises for the participants, for all relevant actors and policies should be well known. Changes in the patterns of interaction that do occur should be gradual, evolving slowly over time.

Interaction of this nature provides a predictable basis for action on the part of an international organization in its attempt to implement policy: areas of resistance as well as support are known, there is little uncertainty regarding the positions of the national organizations involved, and accepted routines of international organizational action in the national context are established. Thus development of SOPs and routine programs for the conduct of international-national organizational interaction provides a means whereby the international bureaucracy can carry out its functions and establish a tradition of bi-level interaction which could serve to facilitate the implementation of future policies within the national context.

In this study we shall attempt to discern the extent to which safeguards policy can be regarded as an output of the organizational processes of the IAEA and of relevant Japanese organizations. The policy will be analyzed in terms of its consistency or inconsistency over time, its rate of change and continuity of involvement of participant organizations, as well as in terms of consistency in patterns of communication and negotiation between the IAEA and Japanese organizations regarding safeguards. It is hoped that such an analysis will provide some indication of the degree of stability and continuity that has been established in the realm of safeguards policy and indicate the extent to which routinized patterns of interaction between the IAEA and Japanese organization can be utilized by the international organization to facilitate the implementation of its policies.

Organizational Personnel

Just as structural analysis sets the stage for a study of decision-making, so does decision-making analysis lead us to a study of the decision-makers. It is commonly acknowledged that in the final analysis, the study of politics comes down to the study of people, of groups of people and of individuals. There is little consensus in political science however, regarding the most productive approach to the study of people. Indeed, as was observed above, there are some who argue that individuals have a negligible impact on the policy decisions and outputs of organizations. Those who argue in favor of consideration of the individual as a significant determinant of decisions and policies have adopted a variety of approaches

to analyze individual behavior. Elite and leadership analysis, socialization studies, and motivational analysis exemplify only a few of these approaches. Our concern here is to attempt to evaluate the extent to which an individual in either an international organization or in a national organization can shape the nature of the interaction which occurs between the international and national organizations during the course of attempted policy implementation by the international organization.

In his Governmental (Bureaucratic) Politics model, Allison has suggested that government action can at times be regarded as "an agglomeration or collage composed of relatively independent decisions and actions by individuals and groups of players . . ."[51] Allison goes on to suggest that organizational position determines whether an individual can have an important effect on governmental actions; position determines the latitude of and constraints on individual activity. Individuals within given organizational roles determine their interests and policy positions on the basis of both their personal priorities and perceptions and on the basis of their loyalties resulting from being a part of a given organiztion. In short, Allison's bureaucratic politics paradigm is based on the idea that individual action and impact on policy outputs is a function of both the characteristics of the individual--his personal goals, aspirations, perceptions and skills--and of the organizational role held by the individual, which incorporates a set of organizational expectations regarding acceptable behavior and which serves

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[51] Ibid., p. 163.

to locate him in an established hierarchy of other roles, defines his organizational power, his channels of communication, and his perceptions of organizational interests--"where you stand depends on where you sit."

Differentiating between purely individual determinants of behavior and organizational determinants of behavior is, as we have stressed, problematic at best. Here we shall attempt to focus on two sets of variables in an attempt to discern the potential for individual impact on organizational policy and behavior. The first set of variables will focus on organizational role aspects, including position within the organization, expectations associated with this role, and channels of intra- and inter-organizational communication provided by the role. The second set of variables will focus on aspects of personal experience, including socialization, education, professional experience and personal ambition. Much of this analysis will be based on interview data. While this approach is tentative at best, it may offer some insight as to which set of variables seems to best explain individual impact on organizational policy. As Allison has noted,

> The extraordinary complexity of cases of bureaucratic politics accounts in part for the paucity of general propositions. Nevertheless, as the paradigm has illustrated, it is possible to identify a number of relevant factors, and in many cases, analysts can acquire enough information about these factors to offer explanations and predictions.[52]

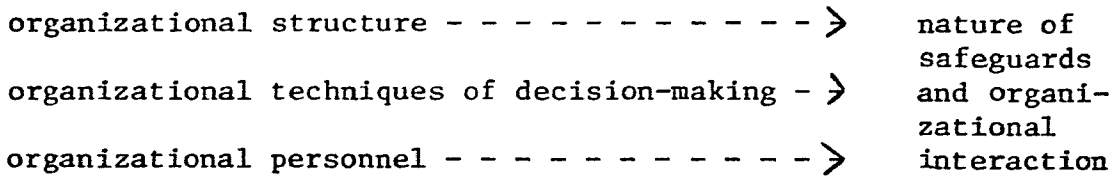
If specific individuals have had an impact on the nature of

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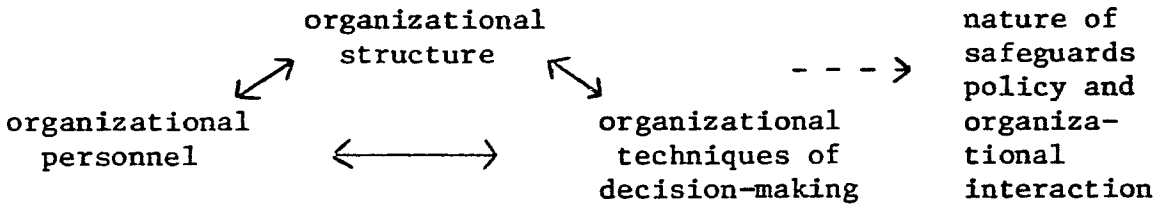
[52] Ibid., p. 174.

safeguards policy as it has emerged during the years of IAEA-Japanese organizational interaction, we might expect that this impact would be most discernable during the initial stages of policy formation or at times of major change in safeguards policy, before organizational processes and standard operating procedures are developed. During times of prolonged consistency in the nature of safeguards policy, when presumably standard organizational routines would guide organizational interaction, individual impact may be imperceptable. One might also expect that those highly placed in the organizational hierarchy might have a greater impact on safeguards policy than those in lesser positions. The extent to which these expectations are fulfilled in reality will be examined in subsequent chapters.

To summarize, we are attempting here to discover the impact which structural variables, organizational processes and organizational personnel have had on the nature of safeguards policy and the interaction which has transpired between the IAEA and specified Japanese organizations. While we are treating each set of variables as independent, it is important to recognize the interactive nature of these variables. Thus, rather than:



we have:



Quantitative analysis of the interaction of these variables is beyond the scope of this study.

We are also suggesting that the nature of the interaction between the IAEA and Japanese organizations regarding safeguards affects the present capacity of the IAEA to implement this policy in Japan, and that present ability to implement this policy can have an effect on the future role of the IAEA within the international system. In short:

nature of IAEA-Japanese organizational interaction - - - > present IAEA ability to implement safeguards policy

present ability to implement safeguards policy in national context - - - - - > future role of the IAEA within the international system

The assumption that the nature of the interaction between the IAEA and Japanese organizations affects the present capacity of the IAEA to implement safeguards policy in Japan is based on the fact that safeguards policy involves a commitment of resources on the part of both the IAEA and Japanese organizations. A Japanese organization does not necessarily have to approve of safeguards policy to ensure its implementation, but it does have to contribute some measure of its resources to safeguards implementation, for IAEA resources alone are inadequate to insure successful implementation.

Thus Japanese national organizations have the potential, through the denial or provision of resources during the course of their interaction with the IAEA, to determine, at least in part, the ability of the IAEA to implement safeguards policy in Japan.

Finally, the assumption that the present ability of the IAEA to implement safeguards policy in Japan can affect the future role of the Agency in the international community is based on the idea, frequently included either explicitly or implicitly in organization theory literature, that effective task completion or attainment of organizational goals is essential to the continued viability and future development of an organization. This idea may be particularly applicable to the study of international organizations, where it is necessary to distinguish between externally imposed and internally defined goals. Externally imposed goals are those goals assigned to an international organization by its member-states either at the time of its establishment or any time subsequent to its founding. As we have seen, the notion of externally imposed goals is inherent in the definition of an international organization as an organization possessing "institutional structures based on treaties which bind together several or many nation-states in long-term agreements designed to foster cooperation with each other, in specified ways, and for the promotion of general or particular political and/or social goals."[53] (Emphasis added.) Certainly, as Jacob and Atherton state, an international organization may assume a degree of independence

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[53]Miller, p. 5.

over time:

> From one standpoint, an international organization is no more than a tool used by governments to carry out joint tasks, and is entirely dependent on their discretion. Yet, in time, it appears to develop an identity of its own, and it acquires a degree of autonomy in representing the common interest of states that sets it apart from and beyond the whim or fancy of any particular state.[54]

As an international organization achieves a degree of autonomy, it may be that the potential for defining goals internally--that is, the articulation of goals by the executive heads and the staff of the organization--will increase. While the development and pursuit of internally defined goals may enhance the autonomy of the international organization and decrease its vulnerability to attacks or withdrawal of support by any given member-state, it is nonetheless an inescapable reality that an intergovernmental international organization is dependent for its long-term survival on the continued support of powerful nation-state members. Thus, as the needs and expectations of member-states change over time and produce consequent changes in international organizational goals, the international organization must continue to provide some minimum level of satisfaction for each member to insure its continued support. That is, the perceived benefits and returns of state membership in the international organization must, in the long run, exceed the perceived costs of membership for nation-state support of the international organization to continue. Thus, even those international organizations in a position to pursue internally defined goals in addition to those

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[54]Jacob and Atherton, p. 18.

externally imposed, must achieve some degree of effectiveness in the pursuit of goals sought by member-states to insure member support and the ultimate survival of the organization itself. Moreover, the attainment of external goals may serve to reinforce member-state confidence in the international organization as an organization that can produce discernable results and encourage member-states to assign new functions to the international organization and provide expanded resources for the fulfillment of these functions. Failure of the international organization to attain external goals, however, can lead to the withdrawal of member support over time and the decline of the organization as a viable institution.

In the pages which follow, we will trace the course of the interaction which has transpired between the IAEA and Japanese organizations regarding safeguards since its beginnings in the late 1950s. We will focus on organizational structure, techniques of decision-making, and organizational personnel as primary determinants of the nature of this interaction and attempt to discern the impact of this interaction on IAEA efforts to implement safeguards policy in Japan. Chapter II will provide an examination of organizational structure, techniques of decision-making and personnel in regard to safeguards policy at the international organization level. Chapter III will present a discussion of safeguards policy in relation to organizational structure, decision-making techniques and personnel in specified Japanese organizations. Chapter IV will include an examination of the interaction which has transpired between the IAEA and Japanese organizations regarding safeguards policy as well as an analysis of the Japanese organizational

perspective of this interaction. Chapter V will focus upon the implications of IAEA-Japanese organizational interaction regarding safeguards for the Agency and its attempts to further expand the scope of safeguards policy.

Before we turn our attention to an analysis of safeguards policy in relation to internal organizational characteristics of the IAEA, it is necessary to specify both the way in which Japanese national organizations were selected for study in this thesis, and the limitations of the approach utilized in this study.

Sample Selection of Japanese National Organizations

The identity of the Japanese national organizations under examination here was determined by the nature of the policy being studied; the attempt has been made here to identify the entire universe of Japanese organizations involved in safeguards policy. Moreover it is important to realize that these organizations are not monolithic and that frequently, as we shall see, only a particular subunit of an organization is involved with safeguards policy.

The Japanese organizations under examination here include:

Governmental	Quasi-Governmental	Industrial	Academic	Newspapers (Indirectly Involved)
Japan Atomic Energy Commission (JAEC)	Power Reactor and Nuclear Fuel Development Corporation (PNC)	Nippon Atomic Industry Group	Tokyo University	Nihon Keizai Shimbun
Science and Technology Agency (STA)	Japan Atomic Energy Research Institute (JAERI)	Tokyo Atomic Industry Group	Kyoto University	Asahi Shimbun

Governmental	Quasi-Governmental	Industrial	Academic	Newspapers (Indirectly Involved)
Ministry of Foreign Affairs	Nuclear Materials Control Center (NMCC)	Mitsubishi Atomic Power Industries Group	Tokyo Institute of Technology	Yomiuri Shimbun
	Electric Power Development Corporation	Sumitomo Atomic Energy Industries Group		
		Electric Power Companies:		
		Tokyo Electric Kansai Electric Chubu Electric Hokkaido Electric Kyushu Electric Shikoku Electric Tohoku Electric Chugoku Electric Hokuriku Electric		
		Federation of Electric Power Companies		
		Japan Atomic Power Company (JAPCO)		
		Japan Atomic Industrial Forum (JAIF)		

Limitations of the Analysis

Inherent in this study are all the many well-known limitations which characterize a case study based on a field study. As Campbell and Stanley have emphasized, case study analysis barely merits recognition as an approach to designing research. Case studies are usually confined to presenting a one-short static photograph of a given situation. They generally preclude comparison and have little internal or external validity in terms

of research design.[55] Yet even purists in the methodological realm of political science acknowledge that case studies can be useful in preliminary attempts to gather information regarding a given topic. Thus this thesis represents a small beginning in an area where there is need for a great deal of further research.

In addition to the severe limitations of case study analysis, this thesis is also a victim of the limitations inherent in field studies. The study presented here is based primarily on data gathered in Vienna and Tokyo during the academic year 1973-1974. These data consist of information from interviews, documents, and a questionnaire distributed in Tokyo. As is generally true of field studies, the quality of the data is affected by degree of access to personnel within the IAEA and Japanese national organizations, by minor variations in the scope and duration of interviews as well as inevitable variance in interview techniques, and by the usual limitations of time and financial resources. Nevertheless, the attempt was made to gather data that would permit some longitudinal analysis and that would encompass all relevant Japanese organizations, thus permitting some comparison. Moreover, the limitations of a field study are balanced to some degree by the advantages this approach offers: as Festinger and Katz have noted, "the great strength of the field type of study is its inductive procedure, its potentiality for discovering significant variables and basic relations that would

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[55] Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago, Rand McNally & Company, 1963), passim.

never be found if we were confined to research dictated by a hypothetical-deductive model."[56]

Keeping in mind both the limitations and advantages of the case study and the field study, we shall begin our analysis.

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[56]Leon Festinger and Daniel Katz, Research Methods in the Behavioral Sciences (New York, The Dryden Press, 1953), p. 75.

CHAPTER II

INTERNATIONAL SAFEGUARDS AND THE INTERNATIONAL ATOMIC ENERGY AGENCY

On December 3, 1953, in an address before the United Nations, President Dwight D. Eisenhower proposed the creation of an international organization to promote the development of peaceful uses of atomic energy; three years later, on October 26, 1956, an international conference of eight-one nations meeting at United Nations Headquarters in New York unanimously adopted the Statute of the International Atomic Energy Agency. This action represented the successful conclusion of a persistent effort on the part of the United States to establish such an organization and climaxed three years of negotiation and discussion among a variety of nations.[1]

PART ONE

THE IAEA AND THE FUNCTION OF SAFEGUARDS

International Atomic Energy Agency: Form and Content

The organization which emerged as a result of the October 1956 agreement has three principal organs: the General Conference, the Board of Governors and the Secretariat. The General Conference convenes annually and is open to all members: in addition to providing

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[1] See Bernhard G. Bechhoefer, "Negotiating the Statute of the International Atomic Energy Agency," International Organization 13 (Winter 1959): 38-59, for a detailed discussion of the negotiation process.

a forum for discussion and exchange of information among representatives from a variety of nations, the Conference approves the annual budget of the Agency, and is empowered to make decisions regarding matters referred to it by the Board of Governors, and to "propose matters for consideration by the Board and request from the Board reports on any matter relating to the functions of the Agency.[2]

The Board of Governors is responsible for drafting the annual budget of the Agency, as well as the annual reports submitted to the General Conference and the United Nations, and "shall have authority to carry out the functions of the Agency in accordance with this Statute, subject to its responsibilities to the General Conference as provided in this Statute."[3] At the time when the Statute for the Agency was drafted, the Board of Governors was expected to function as the dominant organ of the Agency,[4] and this expectation has been to a great degree fulfilled in reality. As Scheinman has observed,

> The statute of the IAEA vests authority to carry out its functions in the board; and the board's program and budget, subject to approval by the General Conference, constitute the framework of agency action. The IAEA's Board of Governors in fact predominates over the General Conference and the secretariat to a greater degree than is true of similar organs in most other international organizations. This is not to say that these other organs of the IAEA are powerless or without influence, but only that the formal prescription of the statute is largely reflected in actual practice.[5]

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[2] IAEA Statute, as amended up to June 1, 1973, Article V.F.2. See also Article V, passim.

[3] Ibid., Article VI.F. See also Article VI, passim.

[4] Bechhoefer, p. 49.

[5] Lawrence Scheinman, "IAEA: Atomic Condominium?" in Robert W. Cox and Harold K. Jacobson, The Anatomy of Influence (New Haven, Yale University Press, 1973), p. 217.

Membership on the Board is determined by a complex formula designed to ensure equitable geographical distribution of membership as well as representation by the most advanced nuclear state in each geographical region. This formula was devised by the founders of the Agency as a result of their recognition that the composition of the Board should reflect the dominance of those states significantly advanced in nuclear development, which would supply the bulk of the nuclear materials and know-how required by the Agency.[6] Consequently a method for selecting Board members was devised whereby the outgoing Board designated thirteen members and the General Conference elected twelve to yield a total of twenty-five (enlarged from twenty-three in 1962 in view of the increase in African membership in the Agency[7]).

> The provisions for selecting the thirteen members designated by the board are complex. The statute divides the world into eight regions. Once the five most advanced states have been designated (regardless of region), the most advanced states in each of the regions not represented by the original five are named to the board. Thus, for each of the eight statutory regions the most advanced nuclear state is assured a seat on the board as long as it can maintain its regional lead. The two states that are major producers of source materials are also designated from among four named in the statute. One state is designated as a supplier of technical assistance. In practice this seat rotates among the four Nordic countries. The twelve members elected to the board by the General Conference are chosen with regard to the regional criterion except that two regions--Latin America, and Africa and the Middle East--must each be represented by four members on the full board.[8]

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[6] Bechhoefer, p. 49.

[7] See "The Board of Governors," IAEA Bulletin 15, no. 4 (1973), pp. 29-32.

[8] Scheinman, in Cox and Jacobson, p. 217. See also Dr. Pavel Winkler, "The Board of Governors," World Atomics, Special Issue, September 1958, p. 7.

Considerable modification of the formula described above was approved by the Agency's member-states in June, 1973; this modification came as the result of pressure initiated at the 1968 Conference of Non-Nuclear-Weapon States. The states meeting at that time argued that the Board did not adequately represent all members of the Agency, notably, the less-developed countries. As a result of continued pressure, an amendment to the Statute of the Agency was proposed by the General Conference and ratified by two-thirds of the Agency's membership.[9] According to this amendment, the number of members of the Board is increased from twenty-five to thirty-four: the out-going Board designates the nine members most advanced in nuclear technology including the production of source materials, as well as the member most advanced in nuclear technology including the production of source material in each of the following areas in which none of the initially designated nine is located: 1) North America; 2) Latin America; 3) Western Europe; 4) Eastern Europe; 5) Africa; 6) Middle East and South Asia; 7) South East Asia and the Pacific; 8) Far East. The General Conference elects an additional twenty-two members "with due regard to equitable representation on the Board . . ."[10] According to Szasz, the overall effect of this amendment is to increase the representation of the less-developed states and increase the responsiveness of the Board to the

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[9]See Paul C. Szasz, "IAEA Safeguards," in Mason Willrich, ed., International Safeguards and Nuclear Industry (Baltimore, Johns Hopkins University Press, 1973), pp. 121-122.

[10]IAEA Statute, Article VI.A.

General Conference.[11]

The Secretariat of the Agency is headed by a Director General who is appointed by the Board of Governors with the approval of the General Conference and who serves as the chief administrative officer of the Agency. According to the Statute of the Agency, the Director General

> shall be responsible for the appointment, organization, and functioning of the staff and shall be under the authority of and subject to the control of the Board of Governors . . . The staff shall include such qualified scientific and technical and other personnel as may be required to fulfill the objectives and functions of the Agency. The Agency shall be guided by the principle that its permanent staff shall be kept to a minimum . . . due regard shall be paid to the contributions of members to the Agency and to the importance of recruiting the staff on as wide a geographical basis as possible.[12]

In keeping with the statutory stricture to keep permanent employees to a minimum, the Agency's staff has grown at a very modest rate: Table 4 (p. 96) shows the gradual increase in Agency personnel.[13]

IAEA: Designated Functions

When the Statute of the IAEA was adopted in October, 1956, it included one article specifying the functions which the new organization would perform. Generally speaking, these functions can be categorized as either development or control functions. In the realm of development, the Agency was given a broad mandate to

> encourage and assist research on and development

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[11] See Szasz, in Willrich, ed., p. 122

[12] IAEA Statute, Article VII.B,C,D. See also Article VII, passim.

[13] Scheinman, in Cox and Jacobson, p. 222. See also Tables 5 & 7.

> and practical application of, atomic energy for peaceful uses throughout the world . . . and to perform any operation or service useful in research on, or development or practical application of, atomic energy for peaceful purposes . . .[14]

More specifically, the Agency was authorized to promote nuclear research for peaceful purposes, to supply materials, services, equipment, and facilities necessary for this research, to facilitate the exchange of information regarding peaceful utilization of nuclear energy, and to act in whatever way possible to bolster the research efforts and the peaceful application of atomic energy in developing countries.

In the area of control, the Agency was authorized to develop standards of health and safety to govern the development and application of nuclear energy, and devise means of implementing these standards in nuclear facilities. Moreover, the Agency was authorized

> 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 way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy.[15]

Of the various articles of the Statute that were debated prior to the adoption of this document and the establishment of the IAEA, none was as controversial as that delineating the Agency's safeguards responsibilities.[16] The entire notion of safeguards, involving as it

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[14] IAEA Statute, Article III.A.1.

[15] Ibid., Article III.A.5.

[16] See Bechhoefer, p. 57.

does infringement on national sovereignty and involvement with economic development, would have been unacceptable to a variety of states had not the United States devised the concept of Agency projects. According to this concept, any state wishing to receive assistance from the IAEA would apply for project support. If the application was approved, the state would enter into an agreement with the Agency which provided for the application of safeguards to any fissionable material supplied by the Agency to the state for use in the project. Thus the obligation of a state to submit to safeguards would arise only if the state received assistance from the IAEA and was not a mandatory condition of membership in the Agency. As Bechhoefer has noted, the concept of project agreements "was essential to the establishment of any agency since the states with weapons programs would never have adhered to the agency if their association subjected their weapons programs to agency scrutiny."[17]

Evolution of Agency Safeguards Policy

At the time of its establishment, there were high hopes among the founders of the Agency that this new organization would serve as a broker for nuclear material, operating to supply source and fissionable materials drawn from the military arsenals of the Nuclear-Weapons States to the peaceful nuclear programs of various states and guaranteeing the supply of nuclear fuel to these programs.[18] The Statute of the Agency incorporated the concept of

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[17] Ibid., p. 50.

[18] See "The First Year of IAEA," World Atomics, Special Issue, September 1958, p. 11.

the Agency as a nuclear broker, and the statutory safeguards responsibilities of the Agency were closely linked to this function.[19]

Much of the first year of the Agency's existence was devoted to practical considerations of administration and organization. While the organizers of the Agency were devoting their energies to assembling a staff and securing accomodations for the new organization, several events occurred which had a significant impact on the subsequent development of the Agency. As Scheinman has observed,

> A major role of the IAEA was to supply source and fissionable materials and to help ensure the continued availability of fuel supplies for national nuclear programs. These provisions were based on what turned out to be two erroneous expectations: that competitive and economic nuclear power was imminent and that source and special fissile materials would be in short supply. The expectation with regard to the economics of nuclear power arose from the 1955 Geneva Conference on the Peaceful Uses of Nuclear Energy. As things turned out, competitive nuclear power was still a distant promise, demand for source and fissile materials was correspondingly much lower than expected, and the euphoric bubble of the mid- and late-1950s burst. Thus, by the time the agency got under way, late in 1957, one of its principal tasks had already been undercut . . .
>
> A second turning point in the prehistory of the agency is a consequence of the policy of the United States. The Atoms-For-Peace program signaled a change in American attitudes toward peaceful nuclear assistance. In 1954 the McMahon Act was revised to allow for such assistance, and between 1955 and 1958 the United States entered into some forty bilateral agreements for the transfer of nuclear knowledge and information and for the sale of research reactors. In each instance arrangements were made whereby the United States would undertake to safeguard and inspect the nuclear facility of the recipient state. Thus, the second of the IAEA's main tasks was undercut. In short, economic and technological conditions, on the one hand, and the policy pursued by the leading nuclear power, on the other, limited

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[19] Ibid., pp. 11-12.

the importance as well as the scope of activity of the agency before it had even got under way.[20]

Stymied before they had begun to function in the realm of regulation and control of nuclear material, IAEA personnel focused much of their attention in the late 1950s and early 1960s on the development of the Agency's assistance programs and on the expansion of the Agency's role in facilitating the exchange of scientific and technical information through the promotion of international meetings and seminars. Yet the Agency's statutory mandate to undertake safeguards responsiblities was not forgotten, and in September, 1958, the concept of safeguards was revitalized to a small degree when the Japanese government requested the Agency to supply three tons of natural uranium for a research reactor. This request for nuclear material was the first of its kind to be made to the Agency, and it provided the motivation necessary for the Board of Governors of the Agency to begin consideration of a set of safeguard principles.[21] Final agreement regarding the nature of these principles was not achieved until March 30, 1961,[22] however, when the Board of Governors approved the first draft of the Agency's safeguards system (see Appendix 1).

The system of safeguards discussed by the Fourth General Conference of the IAEA in September, 1960, and given final approval

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[20]Scheinman, in Cox and Jacobson, pp. 222-223.

[21]See "Reactor Construction Programme in Japan," IAEA Bulletin, April 1959, pp. 5-6.

[22]See Bernard G. Bechhoefer, "Historical Evolution of International Safeguards," in Willrich, ed., pp. 32-38.

by the Board of Governors in March, 1961, represented the culmination of two years of debate and consideration among IAEA staff and member-states. In its final form, this initial system was distinctly limited; the procedures defined covered requirements anticipated "in the immediate future" and related only to reactors with less than 100 MW thermal output, to the nuclear material used and produced in these reactors and to small research and development facilities. It was anticipated that development of additional procedures for larger facilities would occur "as the need arises."[23]

Events transpired in following years to expand considerably the scope of Agency safeguards. In 1962, Soviet resistance to international safeguards began to weaken, and evaporated almost entirely by the time the Moscow Partial Test Ban Treaty was signed in 1963. This shift in Soviet policy served both to facilitate the development of safeguards policy and to reinforce the legitimacy of Agency involvement with this policy. In February, 1964, Agency safeguards were extended to provide coverage of reactors of more than one hundred megawatts, thereby encompassing commercial power reactors. In 1965 the Board of Governors of the Agency reviewed and revised the Agency's safeguards system and the redefined system (see Appendix 2) was approved without dissent by the Board. Thus, as Scheinman has observed this system became "the first program of international inspection supported by both East and West."[24]

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[23]"Atomic Safeguards," IAEA Bulletin, January 1961, p. 11.

[24]Scheinman, in Cox and Jacobson, p. 223. See also, "Breakthrough for International Safeguards," IAEA Bulletin, January 1964, pp. 13-14. See also Appendix 1, 2 and 3.

Following adoption of this system, safeguards coverage by the Agency expanded steadily and by 1968 encompassed the entire nuclear fuel cycle, with the exception of enrichment plants. The gradual but steady expansion of IAEA safeguard functions is reflected in Tables 1 and 2.

Of the various events which have affected the course of the development of the Agency's safeguards system, none was regarded as potentially more significant than the drafting of the Non-Proliferation Treaty (NPT) in 1968. According to Article III.1 of this Treaty,

> Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful purposes to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such state, under its jurisdiction, or carried out under its control anywhere.[25]

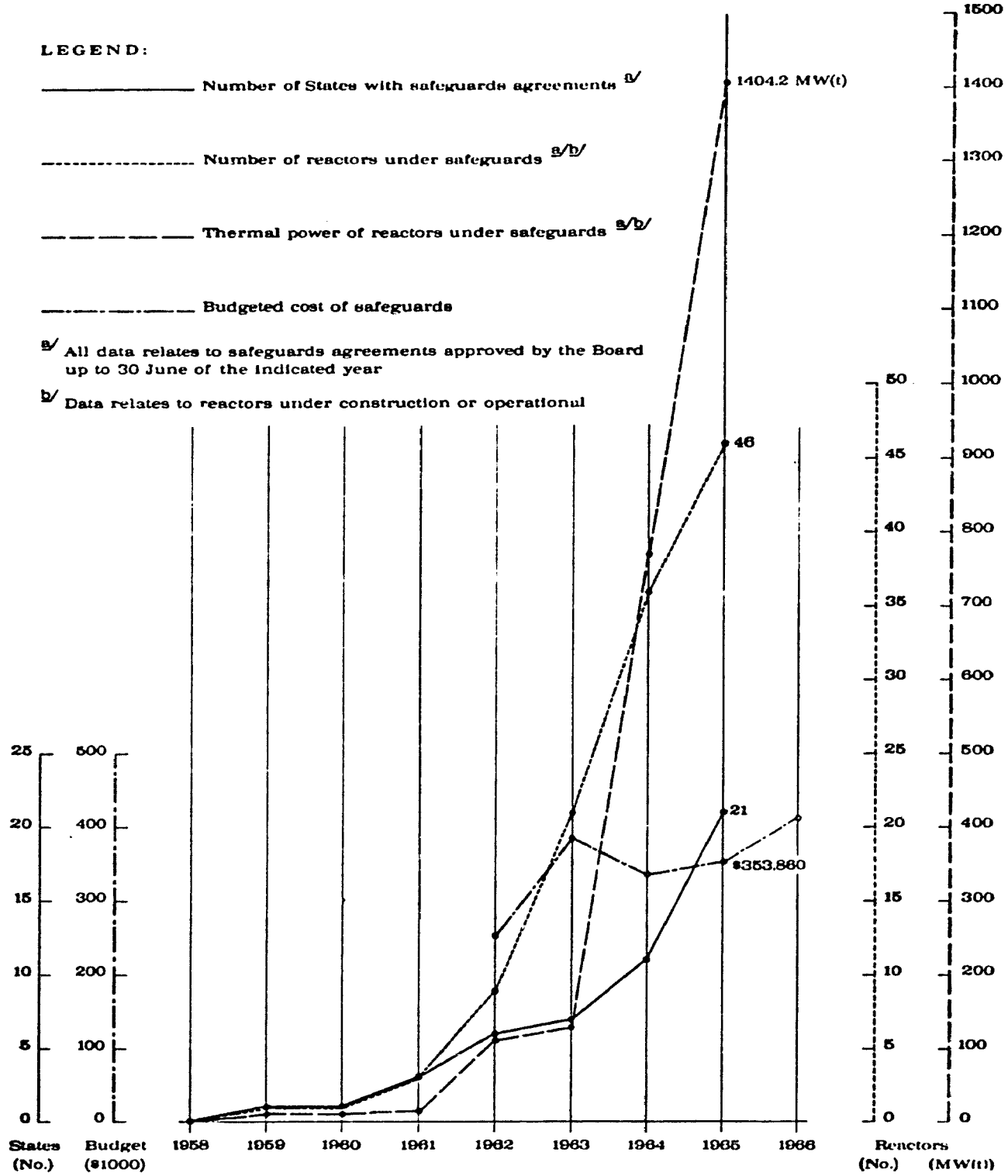
The Non-Proliferation Treaty was available for signature on July 1, 1968, and entered into force on March 5, 1970; in the

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[25] Annexed to UN General Assembly Resolution 2373 (XXII) (1968), reproduced in IAEA document INFCIRC/140, in The United Nations and Disarmament 1945-1970, Sales No. 70.IX.1 (New York: United Nations, 1970), Appendix IX, and in Willrich, ed., pp. 255-260.

TABLE 1

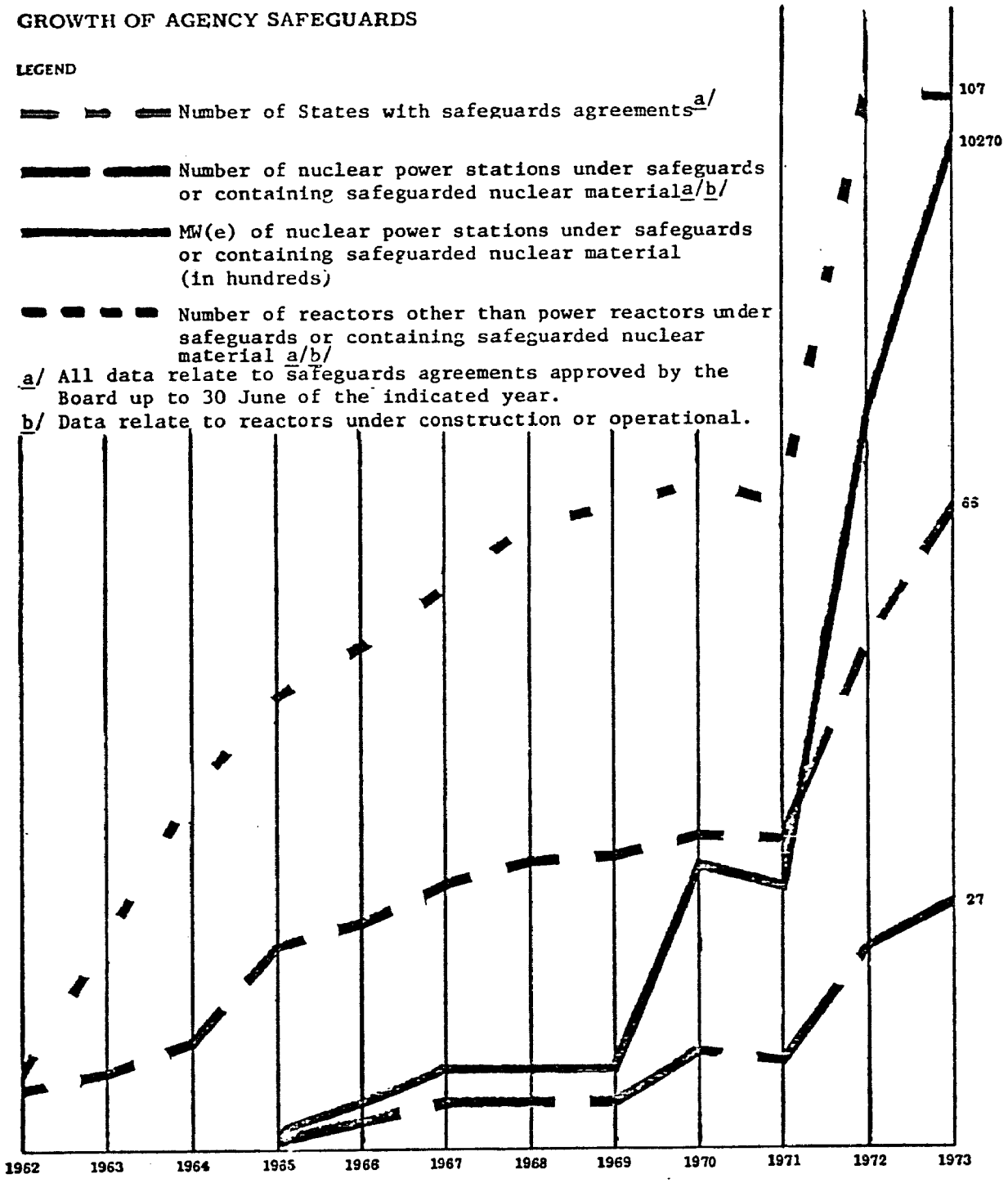
GROWTH OF AGENCY SAFEGUARDS



Source: Annual Report of the Board of Governors to the General Conference, 1 July 1964 - 30 June 1965, GC (IX)/299 (Vienna, International Atomic Energy Agency, 1973) p. 43.

TABLE 2

GROWTH OF AGENCY SAFEGUARDS



Source: IAEA, Annual Report 1 July 1972-30 June 1973, GC(XVII)/500, 1973, p. 57.

interim, the staff of the IAEA undertook to assess the implications of the Treaty for the workings of the Agency. According to the provisions of the Treaty, each Non-Nuclear-Weapon State initially Party to the Treaty was obligated to conclude a safeguards agreement with the Agency and to begin negotiations regarding the agreement within 180 days after the Treaty entered into force (those Non-Nuclear-Weapon States that became Party to the Treaty after March 5, 1970, were obligated to begin negotiations with the Agency within the 180 days following their ratification of the Treaty). When the NPT entered into force on March 5, 1970, this meant, in effect, that the Agency had to be prepared by September 1, 1970, to begin safeguards negotiations with all Non-Nuclear-Weapon States signatories of the Treaty.

At a press conference held on the day the Treaty went into effect, the Director General of the Agency, Sigvard Eklund, noted:

> The Treaty is, however, a reality. Its direct effect on the Agency will begin the day that negotiations on the first safeguards agreement to be concluded under it are opened. The indirect effects of NPT have already been felt; many of the matters the Board of Governors was discussing a few days ago are tied up with the Treaty and the interest which it has aroused in the Agency, its structure and its work.
>
> I have often said that NPT was only a first step: the significance of this 'first step,' however, should not be underestimated. For the first time in history, an international organization has been entrusted with the control functions in a treaty for arms limitation. The way in which the Agency carries out this function may have far-reaching effects on the future structure of international affairs.[26]

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[26]"NPT Now a Reality," IAEA Bulletin 12, no. 2 (1970), p. 3.

There was also some feeling that the NPT could have far-reaching effects on the future of the Agency: negotiation of the Treaty heightened expectations on the part of both the Agency's staff and member-states that the organization was entering a significant new era. "Once implemented, this provision (Article III.1, quoted above) will radically expand the scope of the Agency's control activities and catapult it from its present modest position in the United Nations family to a place among the most important international agencies."[27]

None of the provisions of the NPT specified the nature of the safeguards agreement to be concluded between the Agency and Non-Nuclear-Weapon States Party to the Treaty. Nonetheless it was clear that safeguards negotiated in accordance with the Treaty would differ markedly from pre-NPT safeguards. Prior to the implementation of the NPT, Agency safeguards, as specified in INFCIRC/66/Rev. 2 (see Appendix 2) had applied in three circumstances: (1) when the Agency had arranged for the transfer of nuclear fuel or equipment; (2) when the Agency rather than the donor state was specified as the safeguarding agent by two states concluding a technical assistance agreement, and; (3) when any state unilaterally requested Agency safeguards for a specific facility.[28] At the time the NPT entered into force, the IAEA had concluded approximately forty-two safeguards agreements with some thirty-one countries. While

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[27] Scheinman, in Cox and Jacobson, p. 224.

[28] See George H. Quester, "The Nuclear Nonproliferation Treaty and the International Atomic Energy Agency," International Organization 24 (Spring 1970): 163.

similar in purpose, these agreements also included significant variations; moreover, Agency safeguards coverage within a safeguarded nation was at best piecemeal, affecting, as it did, only specifically designated facilities. The NPT provided for enormous expansion of this coverage; under the terms of the Treaty the Agency would follow the course of nuclear material through the entire fuel cycle. The Treaty also included "an obligation to submit to safeguards and a requirement that most international transfers of nuclear material or equipment (except those to nuclear-weapon states) be subject to controls."[29]

The Agency's Safeguards Committee

Prior to the implementation of the NPT, the Agency had followed the informal procedure of patterning each individual safeguards agreement as closely as possible along the lines of the last previous agreement of the same type; while there was some indication that this procedure would also be followed with respect to NPT safeguards agreements, it soon became apparent that there was need for a more uniform approach. Consequently the Board of Governors of the Agency determined in April, 1970, to establish a committee open to all interested member-states to "advise the Board on the contents of the agreements required."[30] Approximately fifty states sent representatives to Vienna to participate in the

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[29]Szasz, in Willrich, ed., p. 76. See pp. 73-141 for a detailed comparison of pre-NPT and NPT safeguards.

[30]"Toward the Realization of the NPT," IAEA Bulletin 12, no. 4 (1970), p. 7.

Committee's meetings which commenced on June 12, 1970. Each participating member-state was invited to submit in advance its written views regarding the nature of safeguards under the NPT, and by May 31, 1970, responses had been received from twenty-eight governments.[31] Meanwhile, the Secretariat of the Agency prepared a draft of a proposed safeguards system;[32] this draft became the working document of the Committee, with states' delegates proposing additions, deletions and other changes to it.[33]

From June, 1970 until March, 1971, the delegates to the Safeguards Committee met in eighty-two formal sessions and countless informal settings in their attempts to resolve the myriad issues and concerns raised regarding a safeguards system under the Non-Proliferation Treaty. The difficulty of their task cannot be overstated. As one member of the Committee noted:

> When the Safeguards Committee, set up by the Board of Governors in April 1970, started its work in June . . . a difficult task lay ahead. From a formal point of view the task seemed simple: to elaborate guidelines for negotiation for the Director General, to enable him to conclude the safeguards agreements provided for in Article III of the Non-Proliferation Treaty with the non-nuclear-weapon States party to the Treaty. From a technical point of view the task was rather complicated: the Agency's existing safeguards

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[31] See IAEA documents GOV/Com.22/2, May 15, 1970; GOV/Com.22/2/Corr. 1, June 1, 1970; GOV/Com.22/2/Corr. 2, June 1, 1970; GOV/Com. 22/2/Add.1, May 21, 1970; GOV/Com. 22/2/Add. 2, May 28, 1970; GOV/Com. 22/2/Add. 3, June 4, 1970; GOV/Comm. 22/2/Add. 3/Mod. 1, June 16, 1970, passim.

[32] See IAEA documents GOV/Com. 22/3, May 29, 1970, and; GOV/Com. 22/4, June 3, 1970, passim.

[33] See IAEA documents GOV/Com. 22/OR.1, December 7, 1970, through GOV/Com. 22/OR. 55, September 19, 1973.

system is based mainly on the acceptance of safeguards by States receiving nuclear material or equipment by other States. These safeguards are limited to individual nuclear installations or given quantities of material. The safeguards envisaged in the NPT, however, are to apply to all source or special fissionable material in all peaceful nuclear activities in a non-nuclear-weapon State, in accordance with the principle of safeguarding the flow of nuclear material at certain strategic points. Therefore it was not enough simply to include the provisions of the existing safeguards system in the safeguards agreements to be concluded under the NPT. Adaptations to NPT conditions were necessary.

The tasks of the Safeguards Committee proved to be difficult in the political sphere as well, as the negotiating positions varied greatly between the participating Member States. A number of States having ratified the Treaty and not engaged in any significant nuclear activities were interested in an early conclusion of the negotiations in order to keep in line with the deadlines set by the Treaty. They were joined by some other States that favoured the early application of safeguards as provided by the NPT and would have liked to apply the existing safeguards system.

On the other side there were a number of States with significant nuclear activities that had signed NPT, but made ratification subject to a satisfactory agreement on safeguards. This group of States was particularly concerned that the safeguards to be applied would be adapted to the conditions of NPT and that due consideration would be taken of progress made in the field of safeguards techniques.

But even within this group there were differences of opinion, as those States which were not members of any regional grouping--such as Euratom--wanted to be treated in the same way as members of this community.

The fourth group consisted of States which had not signed NPT and which were mainly interested in assuring that there would be no financial burden for themselves arising from the application of NPT safeguards. They were joined by a number of developing countries, parties to the NPT.

The solution of the problems with which the Safeguards Committee was confronted seemed as difficult as squaring a circle.[34]

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[34]Werner Ungerer, "Safeguards: Five Views," IAEA Bulletin 13, no. 3 (1971), pp. 2-3.

At the very heart of the issues involved with establishing an international safeguards system under the NPT was the problem of defining just what was meant by an "effective and acceptable" system. Over the years, a variety of attempts had been made to define the characteristics of an effective and acceptable safeguards system; yet little consensus had been achieved. Many of these suggestions have been incorporated into the definition offered by Henry D. Smyth, who served as the senior member of the United States delegation to the Safeguard Committee meetings. According to Smyth's definition, an effectively operative safeguards system has at least four essential characteristics: technical effectiveness, credibility, cost, and acceptability.[35] Many of the issues discussed by the delegates to the Safeguards Committee were related to the problem of delineating the specific aspects of these four characteristics.

Technical Effectiveness

Although technical experts in the realm of safeguards are in frequent disagreement concerning the nature of the technical requirements of a safeguards system, agreement has been achieved on at least one point: no safeguards system can be one hundred percent effective. Indeed, this agreement was reached early in the history of the development of Agency safeguards:

> It is not considered feasible for the Agency to set up a system of safeguards that would guarantee that no nuclear material at all could be diverted to unauthorized use. What the Agency intends is to

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[35]See Henry D. Smyth, "The Need for International Safeguards," in Willrich, ed., pp. 14-18.

> apply its safeguards in such a manner as to achieve a high probability of detecting the diversion of even small quantities of materials, and when larger quantities are involved, to make detection almost certain.[36]

By the time the Safeguards Committee began its meetings, there was a growing desire among the technical experts participating in or acting as advisors to various national delegations to transform the technical basis of safeguards from, as one expert put it "a global mind-reading exercise"[37] applied on a piecemeal basis to individual nuclear facilities within a given nation to an objective system based on system theory and statistical analysis, which could monitor the entire flow of nuclear material within a nation.[38] It was asserted that statistical techniques would provide a basic rationale for applying safeguards--a rationale which was lacking under non-NPT safeguards--and would enable the Agency to say with a particular degree of confidence that a given amount of material could be accounted for.

Technical experts advocating increased reliance on systems theory and statistical analysis as a means of codifying and improving safeguards procedures were quick to acknowledge a number of problem-areas requiring solution. For example, application of

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[36]"Safeguards for the Atom," IAEA Bulletin, October 1959, p. 17.

[37]Ryukichi Imai, Nuclear Safeguards, Adelphi Papers, no. 86 (London, The International Institute for Strategic Studies, 1972), p. 11.

[38]See W. Hafele, "Systems Analysis in Safeguards of Nuclear Material," Fourth United Nations International Conference on the Peaceful Uses of Atomic Energy (Geneva, Switzerland, September 6-16, 1971), for an excellent discussion of the application of systems analysis to safeguards policy.

safeguards to the entire nuclear fuel cycle within a nation necessitated the definition of specific safeguards procedures for each stage within the cycle. Table 3 depicts each step in this cycle: at each stage the form and content of the nuclear material varies, thus requiring appropriate safeguards measures. Among the technical considerations which enter into the specification of safeguards procedures for each stage of this cycle are included: 1) the physical form of the nuclear material--gaseous, liquid or solid; 2) the level of radioactivity of the material, and; 3) the chemical composition of the material. The difficulty of defining appropriate measures is compounded by a number of factors including such things as changes in the state of the material as it passes through the fuel cycle. For example, the fuel assemblies which are used in a nuclear reactor can be counted both when they are loaded and unloaded. The material within these assemblies changes in the reactor however, a change which is not discernable from the external appearance of the assembly. Thus, those concerned with applying safeguards must discover technical means of detecting the internal changes which have occurred which will enable them to determine now much material has been consumed, and how much remains.[39]

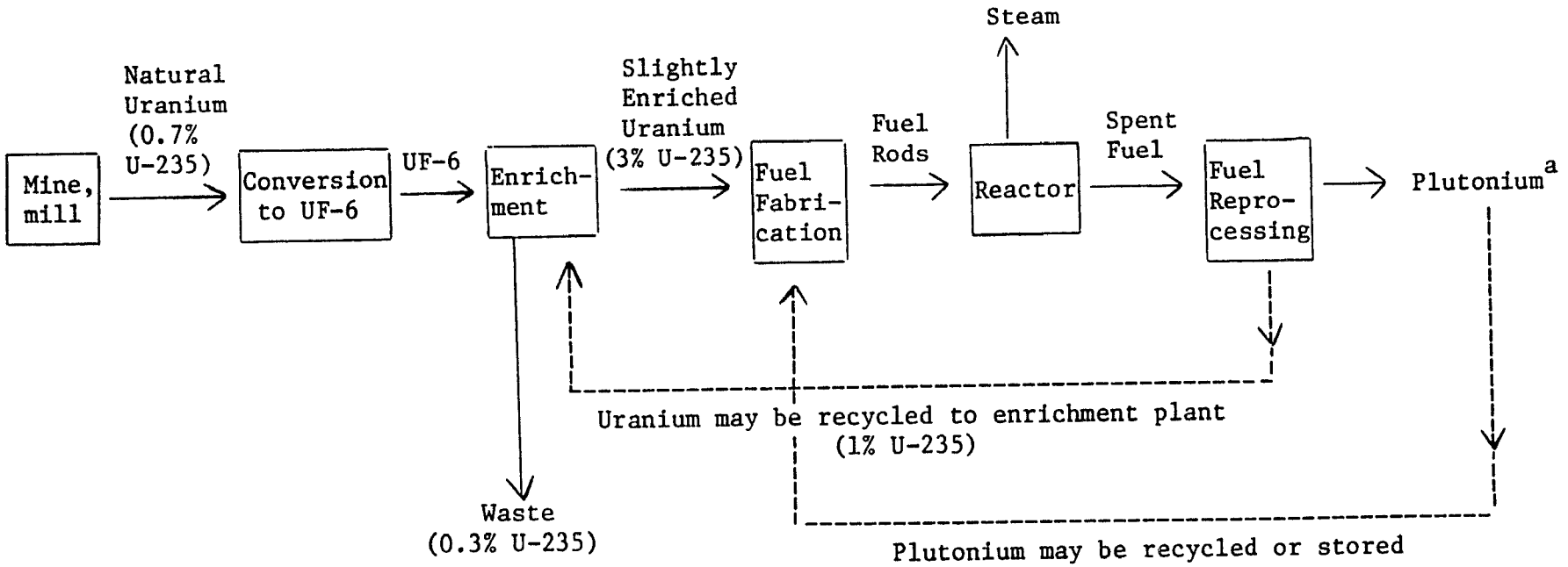
In addition to the problem of defining appropriate safeguards measures for each stage in the nuclear fuel cycle, technical experts cited several other problems related to improving the technical effectiveness of an international safeguards system. Any understanding of these problems must be based on at least a minimal

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[39]Smyth, in Willrich, ed., p. 11.

TABLE 3

EXAMPLE OF A CIVILIAN NUCLEAR FUEL CYCLE FOR REACTORS FUELED WITH SLIGHTLY ENRICHED URANIUM[a]



[a]The plutonium could be recycled in the reactor or stockpiled for future use in a following generation of fast breeder reactors.

Source: Victor Gilinsky, "Military Potential of Civilian Nuclear Power," in Bennett Boskey and Mason Willrich, ed., Nuclear Proliferation: Prospects for Control, New York, The Dunellen Company, 1970), p. 47.

awareness of some of the technical characteristics of a safeguards system. Imai Ryukichi has provided a brief summary of these characteristics in one of his publications regarding safeguards:

> The required key to international safeguards lies in nuclear material accountability . . .
>
> The basic structure of modern safeguards technology is as follows:
>
> (a) In order to facilitate the control of nuclear material accountability, the basic elements of a system in which nuclear material is handled are defined as Material Balance Areas (MBA). Nuclear material flows into an MBA through a defined inlet and leaves it through a defined outlet, both of which are Strategic Points where measurements are taken. There will be a periodic Inventory Taking to measure nuclear material within the MBA. For a given period of time: (Beginning Inventory) + (Input) - (Ending Inventory) - (Output) = MUF (Material Unaccounted For). Typically, an MBA is a power reactor, its cooling pond, a fuel reprocessing area, or a plutonium storage facility. Output includes known and measured loss.
>
> (b) Records are kept of measurement results and of the movement of nuclear material from one MBA to another. These are reported in summarized form to the IAEA as a periodical Report or a Special Report. It is very important that reports from different MBAs in a national fuel cycle should present a consistent picture of the flow of nuclear material throughout the nation. Cross-checking for consistency will allow the Agency to determine whether there are any irregularities, since it is very difficult in reality to cover up a diversion and still to present a consistent national picture. This is because of the close inter-relationship of nuclear facilities within the fuel cycle.
>
> (c) If the boundaries of an MBA are completely contained, so that there can be no chance of nuclear material entering or leaving by routes other than the defined inlet and outlet, the problem is very much simplified. Containment and the surveillance of containers are important features of a safeguards system. To take one type of MBA, perfect containment of a reactor can be achieved by placing tamper-proof seals on the reactor pressure vessel.
>
> (d) Inspection is a means of verifying that the information received by the IAEA represents the

> true situation. It consists of the following categories of activities: (i) verifying that there is consistency between reports and records; and (ii) carrying out independent measurements of nuclear material in order to satisfy the IAEA that there is no falsifying of activities; and (iii) carrying out surveillance to ascertain the integrity of containment. Function (i) can be carried out periodically, while (ii) and (iii) should be conducted by random sampling, which is a widely accepted procedure in industrial quality control . . .
>
> The IAEA safeguards system provides for several levels of action. There will be a normal level of inspection, at which the inspectors are permitted to have access only at pre-determined strategic points and to ordinary records. This level of access is agreed (upon) with the IAEA beforehand and reflects the design information submitted by states to the Agency. Whenever the normal level of inspection produces specific reasons for suspecting the possibility of diversion, the Agency, having explained those reasons, will be allowed to ask for further access. Depending on the degree of suspicion or uncertainty a further special inspection may be carried out thereafter. Safeguarding is thus not a black-and-white operation, but involves activity on a number of sequential levels before action is finally taken against non-compliance.[40]

Imai's summary gives some indication of the complexity of the technical aspects of a safeguards system and the kinds of technical issues which challenge attempts to develop and refine this system. These issues include, to cite only a few, defining the format, specificity and frequency of records and reports submitted to the IAEA, determining the sampling scheme for testing the credibility of the operator's data, defining MBAs and strategic points, refining computer programming to facilitate the handling of safeguards data at the operator's level, as well as the national and international levels, improving a variety of measurement techniques required to determine accurately the amount of material unaccounted

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[40] Imai, Appendix 4, p. 32.

for (MUF), drafting of designs of nuclear facilities to facilitate safeguards procedures, and determining the frequency and duration of inspections.[41]

Credibility

While the degree of technical effectiveness of an international safeguards system is an important criterion for evaluating the potential of the system to achieve its basic goal of timely detection of diversion of nuclear material for military purposes, it is not the only yardstick that can be used to measure the utility of the system. A second characteristic of international safeguards deemed necessary to the effective functioning of the system and discussed among delegates to the Safeguards Committee meetings was that of credibility. This characteristic derives from the necessity that the states submitting to IAEA safeguards truly believe that this system can accomplish its defined goal of detection of diversion. Thus, the safeguards system must operate in a manner designed to inspire and perpetuate the belief that if diversion is attempted, it will in fact be detected by the Agency, and enable the Agency to sound an international alarm. This psychological component in the definition of an effective safeguards system was

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[41]For further discussion of the technical aspects and problems involved in developing a safeguards system, see Herbert Scoville, Jr., "Technical Capabilities of Safeguards," in Bennett Boskey and Mason Willrich, ed., Nuclear Proliferation: Prospects for Control (New York, The Dunellen Company, 1970), pp. 53-61. See also, Safeguards, (Vienna, IAEA, 1972), passim. See also K.B. Steward and J. L. Leach, The Role of Statistics in Safeguards (Washington, D. C., USAEA Report BNWL-1385, UC-15, 1970), passim.

closely linked by some participants in the Safeguards Committee meetings with the Agency's inspection system and its right of access to national nuclear facilities.[42] Moreover, this connection has been emphasized by a number of experts: Paul Szasz has noted that

> while the efficacy of IAEA safeguards rests primarily on the records that must be maintained about all peaceful nuclear material, facilities, and operation in non-nuclear-weapon states, the credibility (emphasis added) of these controls depends almost entirely on the fact that the Agency may and does carry out inspections to determine the extent to which the records correspond to reality.[43]

George and Lumb have stated that

> it should be emphasized that the right of access is fundamental to the credibility of the Agency's safeguards system. The Agency must have the right to view the nuclear materials at any given facility, test the quantities present and ascertain those purposes for which it is being used. Any limitation on the right of access diminishes the credibility (emphasis added) of the system.[44]

The practical difficulties of linking the credibility of international safeguards with IAEA inspections and right of access are discussed below, in the section concerning acceptability of safeguards. If one accepts the suggestion that the credibility of international safeguards is a function of the nature and degree of Agency inspections and access, it appears that the resolution of

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[42] See, for example, S. Tamiya, et al., "A Review of the National Safeguards System in Japan and its Systems Study," Peaceful Uses of Atomic Energy 9, reprint (1972): 349.

[43] Szasz, in Willrich, ed., p. 101.

[44] Douglas E. George and Ralph F. Lumb, "International Safeguards," in Mason Willrich, ed., Civil Nuclear Power and International Security (New York, Praeger Publications, 1971), p. 47.

these difficulties is the sine qua non of safeguards credibility.

Costs

A third quality deemed essential to the effective operation of an international safeguards system is that of reasonable cost. Agreement among delegates to the Safeguards Committee regarding the definition of the term "reasonable" proved difficult, however.[45]

When the Safeguards Committee convened in 1970, a variety of predictions had been made by both the IAEA staff and experts within nation-states regarding the impact of the NPT on the workings of the Agency. Among these predictions were several grandiose statements concerning the effect of the Treaty on the Agency's inspection system: one estimate envisioned an army of 60,000 Agency inspectors spread across the globe, monitoring the peaceful nuclear activities of the Non-Nuclear-Weapon States. Needless to say, this estimate created varying degrees of dismay and alarm among a number of national delegations. Such an expansion of the Agency's inspectorate would be unthinkable for a variety of reasons: in addition to the astronomical cost involved, states were unwilling to permit such a dramatic increase in the power of the Agency. In addition to reflecting the political and economic realities of nation-state control over the IAEA, the reluctance of its member-states to finance a significant increase in the control functions of the Agency appears to suggest in a vary pragmatic way, a certain symbolic quality of nation-state involvement with safeguards. A broad consensus prevailed that some international monitoring of

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[45]Szasz, in Willrich, ed., p. 125.

the peaceful nuclear activities of Non-Nuclear-Weapon States was desirable and should encompass the entire flow of nuclear material in a given state: thus the safeguard monitoring function of the Agency could be expanded under the Non-Proliferation Treaty. However, expansion of this monitoring function should not include the practical apparatus necessary to enable the IAEA to engage in the strict application of safeguards, which, at the extreme, could be regarded to include resident inspectors at every nuclear facility in a Non-Nuclear-Weapon State, twenty-four hour surveillance, and unconditional access to all parts of all nuclear facilities. Thus, underlying the discussions regarding the costs of safeguards under the NPT was the apparent assumption that while international monitoring was desirable, international control was not: the expansion of the scope of the Agency's safeguards monitoring should not be confused with a corresponding reduction in nation-state control.

Those concerned with hammering out some sort of consensus concerning the matter of safeguards financing found the problem to be multifaceted; as Smyth has observed, "there are really three questions: the total cost of IAEA safeguards, the distribution of that cost among the members of the agency, and the division of costs between the agency and a particular country for safeguards under NPT in that country."[46] All states were concerned with minimizing the total cost of safeguards. Those states with little capacity for developing their own nuclear potential were concerned with

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[46]Smyth, in Willrich, ed., p. 16.

minimizing the amount they would be required to pay for safeguards. Moreover, developing countries argued that safeguards costs should be kept to a minimum to insure that Agency funds were not diverted from development projects and aid programs. Some of the Non-Nuclear-Weapon States asserted that safeguards costs should be borne by the Nuclear-Weapon States, for the NPT provided for the application of safeguards only to Non-Nuclear-Weapon States: thus, the states obligated to accept safeguards under the NPT argued that their acceptance of this obligation was payment enough and that the dollars and cents costs of safeguards should be exacted from those parties responsible for imposing safeguards.

The problem of financing safeguards was further complicated by the issue of cost effectiveness. As stated above, no safeguards system is regarded as one hundred percent effective; rather, the IAEA could verify non-diversion only within a specific confidence interval. Clearly the higher the confidence interval the less the threat of diversion. Yet the costs of raising the level of confidence by one degree are enormous. Hence the concept of cost effectiveness was developed: this concept provides for the expression of the ratio of technical effectiveness/cost. Beyond a certain ratio--generally set at a 95% confidence level--an increase in effectiveness became prohibitive in terms of cost, and was regarded as unacceptable.[47]

Also compounding the problem of financing safeguards was the offer made by two Nuclear-Weapon States, the United States and

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[47]See Tamiya, et al., p. 350.

Great Britain, to submit their peaceful nuclear facilities to IAEA safeguards. This offer, regarded as a political means of guaranteeing some equalization of the burden of safeguards between the Nuclear-Weapon States and Non-Nuclear-Weapon States, was meaningless in terms of the fundamental purpose of safeguards, namely, timely detection of diversion. Moreover, if the IAEA were to undertake safeguarding of all peaceful facilities in these two nations, it would subject the Agency to an enormous financial burden. Unofficial estimates placed the cost of safeguarding American and British facilities at over $4 m. (million) in 1973, while the cost of safeguarding the facilities of Non-Nuclear Weapon States accepting IAEA safeguards would be $3.85 m. for the same year.[48] At the time of this writing, discussion regarding the conclusion of a safeguards agreement between the Agency and these two countries is continuing. Before any agreement can be reached, however, questions concerning matters such as the assessment of payment for safeguards in these countries must be answered.

Prior to the implementation of the NPT, part of the administrative budget of the IAEA was devoted to the payment of safeguards expenses. Like the Agency's other administrative expenses, safeguards expenses were shared by all member-states according to a scale based on the United Nations scale of contributions, which was modified to take account of the differences in the membership of the organizations.[49] The compromise which was finally worked out

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[48] Imai, p. 16.

[49] Szasz, in Willrich, ed., p. 128.

regarding the financing of safeguards under the NPT provided for a continuation of this principle of shared expenses, with, however, some accomodation for those states only peripherally involved with safeguards. According to this compromise,

> the member states with a per capita net national product of less than one-third that of the ten members having the highest per capita product will bear only one-half of their normal share of all safeguards costs or 16.9 percent (the 1971 ratio of safeguards to non-safeguards expenses in the Agency's budget) of their contributions to the non-safeguards budget, whichever is the less, but an amount at least as great as their share of the 1971 (the last pre-NPT year) safeguards expenses. The rest of the safeguards expenditures will be divided among the remaining states in proportion to their normal assessment ratios. The result is to relieve about 70 percent of the membership from most NPT-related safeguards costs.[50]

Acceptability

The final characteristic included in the definition of an effective safeguards system is that of acceptability. This is also, perhaps, the most difficult attribute to develop. An international safeguards system may be technically effective, it may be believable, it may be reasonable in cost, yet if it is rejected by those states to which it is applicable, it is useless. Moreover, the definition of what constitutes an acceptable safeguards system varies from one state to the next. Consequently, a number of reservations and objections regarding the acceptability of international safeguards have been voiced by various states' representatives at various intervals, including those attending the Safeguards Committee meetings. Many of these reservations can be

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[50] Ibid., p. 129.

placed in one of two categories: reservations regarding the nature of safeguards per se or reservations regarding safeguards in connection with the Non-Proliferation Treaty.

Among the objections expressed regarding the nature of safeguards per se several are particularly outstanding. In view of the challenge of safeguards -- involving as it does inspection by international officials and monitoring of national reports and records-- to traditional national sovereignty and purely national control over nuclear material, several states objected to the alleged intrusive quality of safeguards. Safeguards, it was argued, created interference with plant operations in a number of ways. Safeguards require time--time on the part of the operators of the facility involved, time on the part of the national official designated to accompany an IAEA inspector on his rounds, and time on the part of a number of people whose task it is to prepare required reports and records for the Agency. Moreover time could be lost if a safeguards procedure necessitated the slow-down or shut-down of a facility's operations. Safeguards, furthermore, required the attention of highly trained personnel, whose talents could perhaps be profitably employed elsewhere. The most significant and objectionable aspect concerning the intrusiveness of safeguards, however, was the alleged potential for industrial espionage.[51] Several states expressed reluctance to permit an IAEA inspector--a national of another state--to conduct inspections in their nuclear facilities, for fear

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[51]See, for example, Scoville, Jr., in Boskey and Willrich, ed., p. 55.

that industrial secrets concerning the operations of these facilities would be divulged to the national of another state.

At the very heart of these objections is the linkage between technology and politics inherent in the nature of safeguards policy. As Imai has noted,

> . . . the institution of safeguards is probably the first occasion in international history when technology and politics have been so completely intertwined on a global scale . . . The role of technology in modern society is very different from what it was even half a century ago. The economic well-being of a nation has a direct relation to its level of technological achievement. Nations today are very sensitive about anything which might adversely affect their technological and industrial development. In this sense, technology is now very much a part of politics.
>
> At the same time, even today, it is rare to find a person who is knowledgeable in both technological affairs and international politics, though there is no dearth of experts in either field . . .
>
> A basic difficulty lies in the lack of communication between the political and scientific communities: each has its own slightly different interpretation of the meaning of the word "safeguards."[52]

In addition to the objections to safeguards per se expressed by states submitting to this system are objections regarding a safeguards system in conjunction with the Non-Proliferation Treaty. Many of these objections focus on the inherent asymmetry of the Treaty. As Palfrey has observed,

> It may sometimes sound rather improbable, on the face of the proposal, for just three of the five nuclear weapon countries to call upon all the non-nuclear weapon countries of the world to sign a treaty to agree not to develop the nuclear weapons which all five nuclear powers have already developed and are continuing to develop. It may sound still

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[52] Imai, pp. 1-2. See also pp. 20-22.

> more improbable to call upon the non-nuclear-weapon powers, in addition, to accept mandatory international safeguards on their own lawful, peaceful nuclear activities to assure the nuclear weapon countries, and each other, that they will not secretly divert the fissionable material, that they are using and producing for civilian purposes, to build bombs--especially when the nuclear weapon countries are accepting no such inspection as part of the bargain. Nevertheless, these are the terms of the Non-Proliferation Treaty.
> . . . What, after all, do the nuclear powers really give up? What do the non-nuclear powers acquire, except a commitment to a series of self-denying ordinances, and a required international inspection system that could lead to inconvenience, expense, and possible loss of trade secrets in a competitive nuclear power world market?[53]

Among the many complaints expressed by the Non-Nuclear Weapon States concerning safeguards under the NPT were objections to the increased expense and alleged inconvenience of safeguards which were not shared by the Nuclear-Weapon States. Non-Nuclear-Weapon States argued that the costs of safeguards threatened their ability to compete with Nuclear-Weapon States in international markets, for the costs of safeguards allegedly increased production costs for Non-Nuclear-Weapon States, but not for Nuclear-Weapon States.[54] Moreover Non-Nuclear-Weapons States forever forfeit the international prestige associated with the possession of nuclear weapons, and deny themselves the use of threats and promises based on possession of nuclear arms as a bargaining tool in international diplomacy.

Many Non-Nuclear-Weapon States also expressed a great deal

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[53]John Gorham Palfrey, "Assurance of International Safeguards," in Boskey and Willrich, ed., p. 81.

[54]Interestingly, no state has produced hard data to verify or refute this claim.

of concern regarding the equal application of safeguards under the Non-Proliferation Treaty. What assurance was there that safeguards as applied by the IAEA would be equally rigorous in all states? Would the Agency harbor suspicions regarding the nuclear activities of some states--and consequently apply more stringent safeguards procedures--while relaxing its guard in "less suspect" nations? Concern regarding this question led to corresponding concern regarding a second issue, namely, the application of safeguards in a multi-national as well as in a national context. This concern focused upon the apparent rivalry between the safeguards system initiated and employed by the EURTOM countries and the safeguards system of the Agency. Representatives of the EURATOM nations argued that there was little need for EURATOM countries to submit to scrutiny by two distinct safeguards systems and that EURATOM safeguards were more than adequate to discourage diversion. On the other hand, several Non-Nuclear-Weapon States not party to EURATOM

> objected to any assumption by EURATOM of the Agency's control functions under the NPT, asserting that such responsibility must not be entrusted to a narrow, regional group whose members might collude to produce nuclear weapons under the benevolent gaze of their own inspectors.[55]

Although the NPT included a provision allowing for the negotiation of safeguards agreements between the Agency and Non-Nuclear-Weapon States "either individually or together with other States," several Non-Nuclear-Weapon States argued that this provision did not imply

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[55]Szasz, in Willrich, ed., p. 136.

that these agreements would differ in substance. Indeed the sine qua non of international safeguards under NPT was that all safeguards agreements concluded by the Agency must be as identical in nature as possible, and the application of safeguards by the Agency must be equal for both individual states and groupings of states. Moreover, several delegations from Non-Nuclear-Weapon States participating in the Safeguards Committee meetings argued that safeguards systems developed by individual states must be accorded the same treatment by the Agency as that extended to the safeguards systems employed by multi-state groupings such as EURATOM.

Given the variety and complexity of the issues confronting the Agency's Safeguards Committee, it was with no small sense of accomplishment that the Committee submitted its final recommendations to the Board of Governors in March, 1971, for these recommendations represented virtually unanimous agreement regarding the nature of the Agency's safeguards system under the Non-Proliferation Treaty. One influential member of the Committee labeled the Committee's efforts a "remarkable example of international cooperation," and his words were echoed by a number of participants as well as by members of the Board.

The recommendations of the Committee were incorporated into a publication 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--commonly referred to with varying degrees of reverence by those involved with international safeguards as "The Blue Book." The safeguards considerations and procedures outlined in the Blue Book, INFCIRC/153

(see Appendix 3), are intended to supercede the safeguards system defined in the Agency publication INFCIRC/66/Rev. 2 (1968), (see Appendix 2) and apply to all Non-Nuclear-Weapon State signatories of the Non-Proflieration Treaty. Thus, the provisions of the Blue Book represent the basis upon which the Agency administers NPT safeguards, while INFCIRC/66/Rev. 2 represents the safeguards applied to states not party to the NPT. While the Blue Book includes many provisions incorporated into the Agency's earlier safeguards system (see Appendix 1 and 2), it also includes several provisions not heretofore a part of international safeguards. The most notable of these provisions include: 1) the delineation of strategic points in the flow of nuclear material at which the Agency would verify the presence, amount, and composition of the material; 2) the definition of control regions or material balance areas for the purpose of accounting for nuclear material; 3) a change in the scope of safeguards, from application to specified individual facilities to application to the entire flow of nuclear material in a given state, and; 4) recognition of the importance of national systems of nuclear material accounting in facilitating the application of Agency safeguards.[56] Of these provisions, the one acknowledging the key role which may be played in the future by national accounting systems (see Appendix 3, Article 7) has significant implications for the future involvement of the IAEA with safeguards. We will return to a more detailed examination of this

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[56]For a more detailed summary of the Safeguards Committee recommendations see Myron B. Kratzer, "Safeguards: Five Views," IAEA Bulletin 13, no. 3 (1971), pp. 11-13.

provision and the Japanese role in insuring its inclusion in the Blue Book in Chapter IV.

PART TWO

THE INTERNATIONAL ORGANIZATIONAL CONTEXT OF SAFEGUARDS

In Chapter One it was stated that the primary focus of this study is an examination of the organizational context of and interaction between the International Atomic Energy Agency and specified Japanese organizations regarding safeguards policy, with particular attention directed at organizational structure, techniques of decision-making, and organizational personnel. Before examining the course of the interaction which has transpired between the Agency and organizations in Japan regarding international safeguards, it is necessary to delineate the organizational context out of which safeguards policy has emerged at the international level. More specifically, we are interested in discerning the extent to which the structure of the Agency, its decision-making techniques and its staff could affect the nature of the safeguards policy with which the Agency deals.

Safeguards and Agency Structure

Part One of this chpater provides an overview of the Agency, its designated functions and the history of its involvement with safeguards. The term "IAEA" or "Agency" is frequently used as a convenient means of referring non-specifically to those individuals and subunits within this international organization which have played some role in the evolution of safeguards policy. Upon

closer examination, however, it becomes apparent that the term IAEA refers collectively, as noted briefly in Part One, to three distinct structures, the General Conference, the Board of Governors, and the Secretariat. Each of these structures represents a part of the whole of the international organizational context out of which international safeguards policy has emerged.

The General Conference

Of the three structures comprising the IAEA, the General Conference is the least involved in safeguards policy. However, while its role regarding safeguards is peripheral, it is not necessarily negligible. Although the Conference convenes only once during a year, and then only for a few days, it nonetheless provides a useful forum wherein members of the Agency can express their views, air their grievances and clarify ambiguities regarding Agency policies and programs, including safeguards. The meetings of the Conference are generally well attended--on the average, between two-thirds and three-quarters of the member-states of the Agency send delegations. In addition to providing a convenient forum for the exchange of information regarding Agency policies and nuclear affairs in general, the meetings of the General Conference provide an opportunity for member-states to monitor the activities of the Board of Governors and to suggest or demand changes in policies pursued by the Board.[57]

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[57] See "Looking to the Future," IAEA Bulletin 10, no. 5 (1968), pp. 4-7, and "The Year of the Non-Nuclear Weapon States," IAEA Bulletin 11, no. 5 (1969), pp. 3-7.

While the General Conference lacks the cohesion and power of a tightly structured body having frequent meetings and a slow turnover of representatives, it nonetheless has the potential to serve as the quasi-legislative watchdog of the Agency. All major programs drafted by the Board of Governors and pursued by the Agency must be approved by the General Conference. While approval is generally regarded as a formality, it is not necessarily automatic, particularly when a controversial policy such as safeguards is involved. Thus, at the very least, the meetings of the General Conference serve as a sounding board for the Agency, enabling policy makers to gauge the degree of consensus or disagreement among member-states regarding a given policy. Moreover, the meetings serve to facilitate the exchange of information and opinions, and at times may provide the means whereby member-states can exert pressure for action on the part of the Board of Governors or the Agency's Secretariat. Thus, obtaining the approval of the General Conference for the policies and programs developed in other areas of the Agency is a necessary but not sufficient element in insuring the smooth operation of Agency functions.

The Board of Governors

As the executive body of the Agency, the Board of Governors has played a significant role in the formulation and development of Agency programs, including safeguards policy. Since the inception of the Agency and the beginning of international safeguards policy in the late 1950s, the Board has been responsible for establishing the various committees and groups of specialists

which have met to consider safeguards policies, and has reviewed and approved all safeguards documents before transmitting them to the General Conference for final approval. Moreover, as Paul Szasz has noted,

> The Board of Governors of the Agency has a number of important functions in connection with the administration of safeguards.
>
> 1. The Board approves NPT Safeguards Agreements negotiated by the Secretariat with individual states. In view of its dual nature as an organ of the Agency but composed of the representatives of states, the Board is in a position to resolve differences that arise between the negotiators.
>
> 2. The Board appoints the Director General and approves the appointment of the Inspector General and the assignment of Agency officials and inspectors.
>
> 3. The Board may decide that particular safeguards measures are essential and urgent and may call on the state concerned to take the required action (e.g., the admission of inspectors to areas not normally open to them) without delay and irrespective of any pending dispute settlement proceeding.
>
> 4. The Board decides when the Agency is unable to verify the non-diversion of nuclear material and is responsible for issuing the required reports to states and U.N. organs and for initiating other appropriate sanctions.
>
> 5. The Board will have to decide when, on the basis of technological changes, existing control measures should be eased, tightened, or otherwise changed.
>
> 6. The Board proposes the budget, including the appropriation for safeguards, to the General Conference--which cannot change it without Board concurrence.[58]

While it would be difficult to pinpoint specific instances in which the structure of the Board of Governors has had a perceptible impact on the nature of Agency safeguards policy, it is nonetheless important to note that several structural characteristics of the

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[58] Szasz, in Willrich, ed., pp. 120-121.

Board have had a significant role in shpaing the international organizational context within which this policy has been articulated. Most noteworthy of these characteristics are the composition of the Board, its size, and its modus operandi.

As was noted in Part One of this chapter, membership on the Board of Governors has been determined by a complex formula designed to ensure equitable geographical distribution of membership as well as representation by the most advanced nuclear state in each geographical region. This formula has had the effect of ensuring virtually permanent seats on the Board for some states: as Scheinman has observed,

> although there are no permanent seats in the constitutional sense, a number of states de facto hold permanent Board seats: the United States, Soviet Union, United Kingdom, France and Canada as the most advanced states in the world; South Africa, India, Japan and Australia as the most regionally advanced states. Argentina and Brazil alternate as the state designated as regionally most advanced for Latin America (a matter of prestige rather than objective criteria having led to this formula) but both either by designation or election have always been Board members.[59]

The result of this formula for selecting Board members was to give the illusion if not the effect of providing advanced nuclear powers with a permanent forum in which to express their policy concerns and desires. It is also possible to speculate that as a result of the composition of the Board, bringing together as it

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[59]Lawrence Scheinman, "The International Atomic Energy Agency." Prepared for discussion at a meeting in connection with the comparative study of "Decision-Making in International Organizations," held from November 13-18, 1970 at the Villa Serbelloni, Bellagio, and sponsored by the committee on International Organization of the Social Science Research Council, p. 5.

did representatives of nations advanced in nuclear technology, that this body served to reinforce the perception of commonality of interest in developing safeguards policy. It may be that had the membership of the Board been balanced in favor of less developed nations from its inception, the development of safeguards policy would have absorbed less time and attention on the part of the Board and would not have progressed with any degree of consistency.

As has been previously noted, a movement to counteract the dominance of advanced nuclear state representation on the Board was begun at the 1968 Conference of Non-Nuclear-Weapon States, and culminated in 1973 with the expansion of the Board from twenty-five to thirty-four members. While it is too soon to judge the effect that the expansion of the Board will have on its ability to carry out its responsibilities, it is not unreasonable to expect that this change in the size and composition of the Board may produce discernable changes in its modus operandi.

From the inception of the Agency, the Board has played a dominant role in promoting the development of the Agency and its policies and programs. This was particularly true during the initial years of the Agency's life.[60] As the Agency became established, as procedures and programs became defined and routine, the Board was able gradually to reduce the magnitude of the effort that had been necessary in the early years of the Agency's life to insure the initiation and development of Agency policies. As the

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[60]"The Board of Governors, 1957-1973," IAEA Bulletin 15, no. 4 (1973), p. 29.

Secretariat of the Agency and the Committees established by the Board became functional, it was less essential for the Board to monitor every aspect of the Agency's activities. Policy initiation and implementation could be handled by the Secretariat; expertise on policy matters was available from sources other than the Board. Thus the Board has tended to become more of an overseer and coordinator of Agency activity rather than the primary force in initiating and pursuing Agency programs. Meetings which once consumed an enormous amount of time for Board members now occur only four times a year and include two substantive sessions which usually last about a week, which are held in February and June, and two short sessions usually devoted to procedural matters, which are held before and after the meetings of the General Conference in September.

While the recent expansion in the size of the Board may serve to equalize representation of all groups of member-states, it may also serve to diminish the cohesiveness and efficiency of this body as the executive organ of the Agency. It is conceivable that the increase in size and the corresponding increase in the diversity of the membership of the Board may produce increased disagreement regarding the programs to be pursued by the Agency. Policy interests of the less developed member-states of the Agency tend to focus primarily on technical development rather than on policies such as safeguards, which require sophisticated technology and are, in any event, minimally applicable in less advanced states. Delineation of Agency programs could produce, at the extreme, polarization of Board members on the basis of level of technological development.

Moreover, it may be that the increase in size and diversification of membership of the Board may increasingly introduce controversial issues and considerations into Board deliberations. In the past, the Board, and the Agency as a whole, have consistently attempted to minimize differences among members and emphasize the commonality of scientific endeavor. While this attempt has met with a considerable degree of success in the past, future success lies in the willingness of all Board members to perpetuate an emphasis on common interests and problems. As Scheinman has noted, "the Agency has rarely served as a forum for political controversy."[61] With the use of energy resources as a political weapon and the ever-growing competition for energy sources among both advanced and advancing nations, however, it could be that the discussions of the Board may increasingly incorporate both political considerations and discord. At the very least, Board members may witness a change in emphasis in discussions regarding Agency policies, with policies involving development gaining ascendancy, to the possible decline of programs requiring advanced technology, such as safeguards.

While it is premature to state with any degree of certainty that the expansion of the Board will affect its capacity to function effectively, it nonetheless appears likely that at least some impact will be discernable in the future. It is of course possible that the Board will adapt to these changes with little or no disruption of function. A number of factors, which will be discussed in greater detail below, notably, the increasingly

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[61]Scheinman, in Cox and Jacobson, pp. 229-230.

apparent tendency of de facto permanent Board members representing advanced nuclear powers to engage in on-going informal consultation and decision-making beyond the confines of formal Board meetings and thereby minimize the dimensions of the formal policy making function of the Board, may serve to reinforce the continued future dominance of the Board by these advanced nations and minimize the significance of the recent increase in the size of this body. On the other hand, however, the increase in the size of the Board may make it unwieldly and slower to respond to the needs of the Agency as a whole. The increase in the diversity of membership on the Board may lead to a corresponding increase in discord and polarization of policy positions, and again, render the Board less able to respond effectively to the needs of the Agency. The possibility that any decline in the effectiveness and salience of the Board would correspond with an increase in the power and efficacy of one of the other branches of the Agency, notably the Secretariat, is perhaps distant, but not necessarily unlikely.

The Secretariat

As the administrative branch of the Agency, the Secretariat, headed by the Director General, is the branch most closely involved with the practicalities and problems of the day-to-day operation of the Agency and its programs. It is also the branch which is most closely involved with the development and implementation of safeguards policy, and many of the Agency's safeguards concepts and techniques have been defined by the Secretariat.

During the early years of the Agency, the Secretariat was structured more clearly on paper than it was in practice, and was

less an entity in its own right than it was an appendage of the Board of Governors, utilized primarily to perform the secretarial tasks of the Agency.[62] As time passed, the Agency's programs and staff expanded at a slow but steady pace (see Tables 4 and 5). This expansion corresponded with a leveling off, and gradual stabilization in the level of activity and involvement of the Board of Governors, until the Secretariat assumed the bulk of the responsibility for the on-going daily activities of the Agency. Although still closely linked to the Board of Governors, whose members must appoint the Director General and approve both professional level staff appointments and the policies drafted by the Secretariat, the Secretariat nonetheless has assumed a primary role in refining and implementing Agency programs, including safeguards.

Table 6 provides a chart of the current structure of the Agency's Secretariat. Table 7 depicts the structure of the Department of Safeguards. Each division of the Secretariat is headed by a Deputy Director General (DDG) with the exception of the safeguards division, which is headed by the Inspector General. Table 9 shows the distribution of manpower within the Department of Safeguards; this table indicates that the bulk of the Agency's safeguards effort is devoted to operations—to the implementation and administration of Agency safeguards activities. As Table 10 demonstrates, the personnel staffing the Safeguards Department are arranged in a graded hierarchy.

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[62]"Establishing an Organization," World Atomics, Special Issue, September 1958, p. 8.

TABLE 4

GROWTH IN AGENCY STAFF--PROFESSIONAL LEVEL

1958	1961	1968	1972	1973	1974
161	228	314	419	415	438

TABLE 5

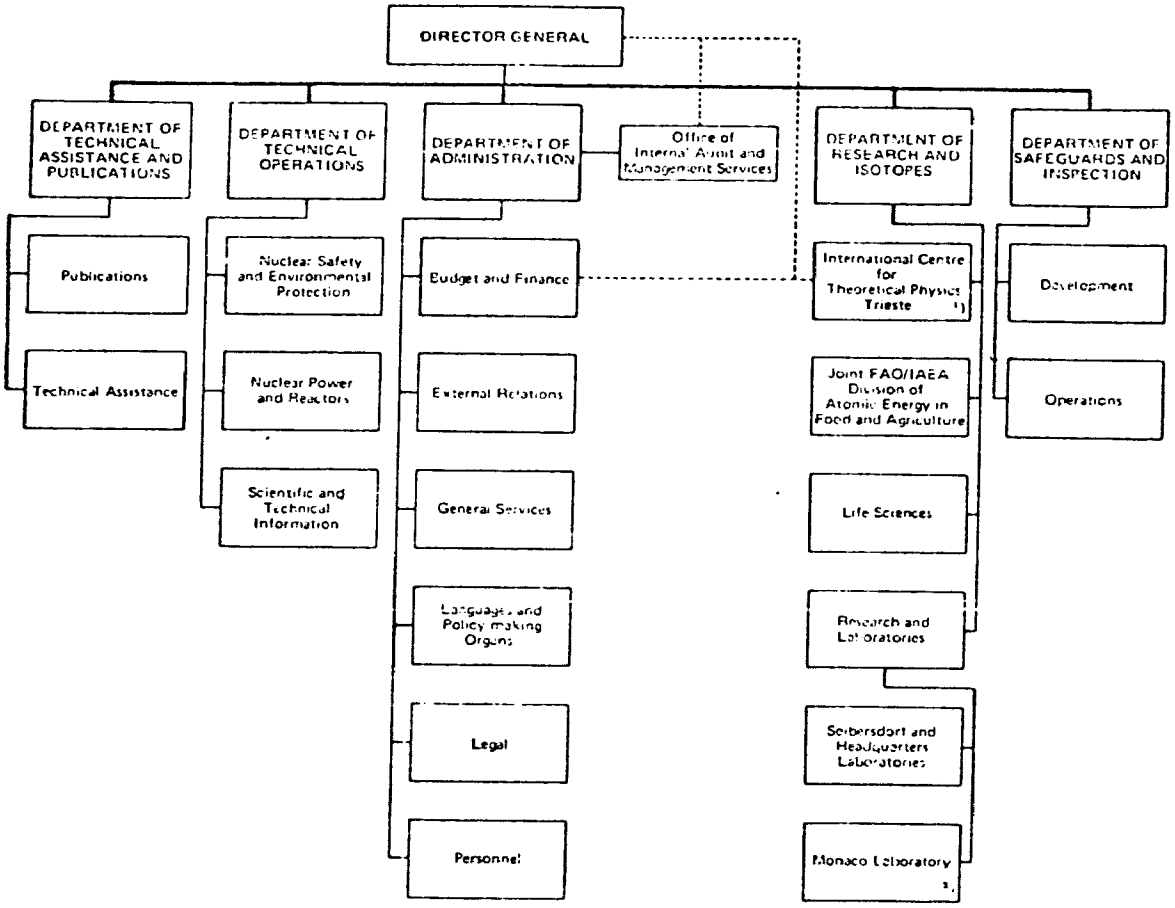
SUMMARY OF TOTAL MANPOWER OF THE IAEA BY GRADE

Grade of Post	Number of established posts				
	1972 Revised	1973	1973 Adjusted	Change	1974
DG	1	1	1	-	1
DDG/IG	5	5	5	-	5
D	19	19	19	-	19
P-5	90	89	89	5	94
P-4	120	123	124	5	129
P-3	106	103	103	10	113
P-2	48	48	48	2	50
P-1	30	25	26	1	27
Sub-total	419	413	415	23	483
GS	517	518	537	16	553
M & O	155	155	156	11	167
TOTAL	1091	1086	1108	50	1158

Source: The Agency's Budget for 1974 (Vienna, International Atomic Energy Agency, 1973), p. 15.

TABLE 6

ORGANIZATIONAL CHART OF IAEA SECRETARIAT



Source: IAEA, The Agency's Programme for 1973-78 and Budget for 1973, GC(XVI)/485, 1972, p. 195.

1) Jointly operated by the Agency and UNESCO.
2) With the increasing participation of UNESCO and FAO

TABLE 7

DEPARTMENT OF SAFEGUARDS

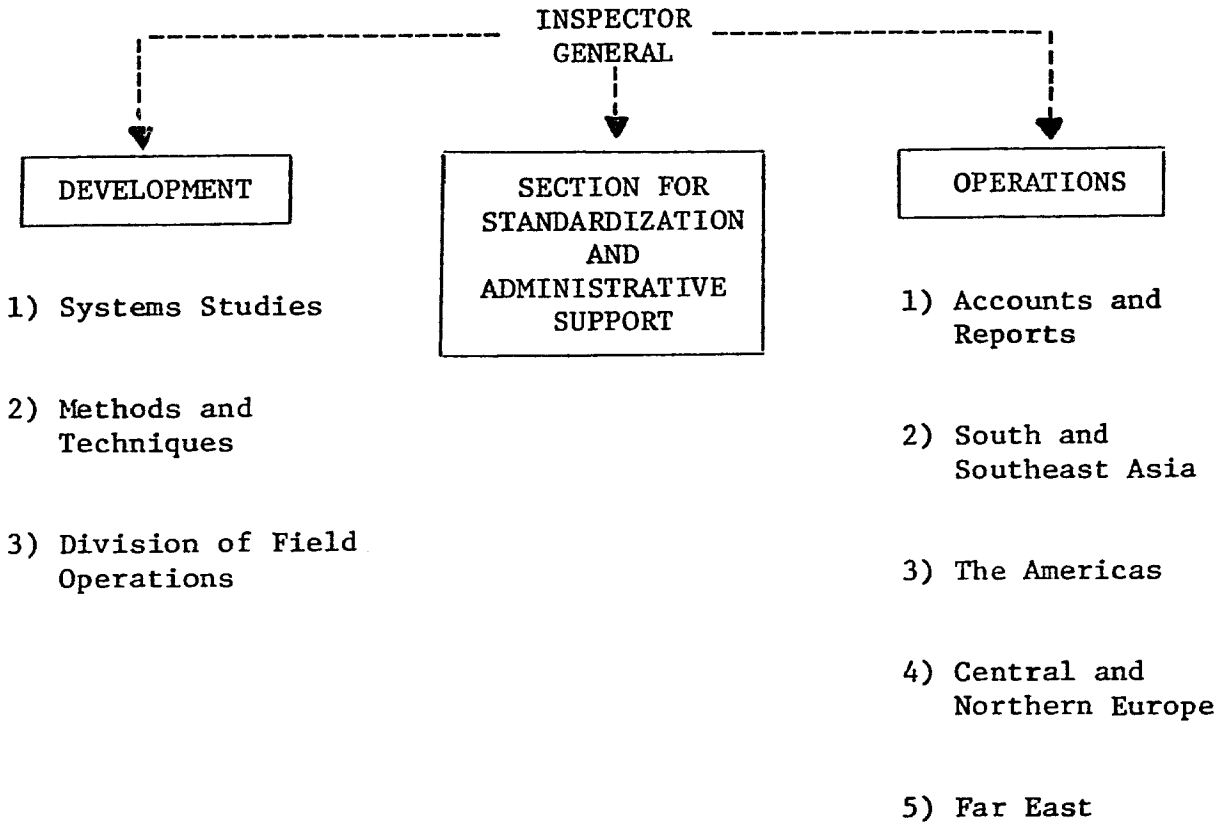


TABLE 8

SUMMARY OF TOTAL MANPOWER BY DEPARTMENT

Department	Number of established posts				
	1972 Revised	1973	1973 Adjusted	Change	1974
Office of the Director General	8	8	8	-	8
Department of Administration	407	407	409	12	421
Department of Research and Isotopes	227	227	227	5	232
Department of Safeguards and Inspection	126	120	120	16	136
Department of Technical Assistance and Publications	174	175	184	5	189
Department of Technical Operations	149	149	160	12	172
TOTAL	1091	1086	1108	50	1158

Source: The Agency's Budget for 1974 (Vienna, International Atomic Energy Agency, 1973), p. 15.

TABLE 9

IAEA: DISTRIBUTION OF MANPOWER BY GRADE

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-Total	GS	M&O	Total
Office of the Director General	1	-	1	1	-	-	1	-	4	4	-	-
Department of Administration	-	1	-	1	-	-	-	1	3	2	-	5
Office of Internal Audit and Management	-	-	-	1	1	2	1	-	5	4	-	9
Division of Budget and Finance	-	-	1	3	3	2	2	5	16	30	-	46
Division of General Services	-	-	1	1	2	4	1	-	9	58	117	184
Division of External Relations	-	-	3	5	4	3	3	1	19	21	-	40
Division of Languages and Policy-making Organs	-	-	2	6	17	24	1	-	50	41	1	92
Legal Division	-	-	1	2	3	1	1	-	8	5	-	13
Division of Personnel	-	-	1	3	3	2	1	-	10	22	-	32
Department of Research and Isotopes	-	1	-	-	-	-	1	-	2	2	-	4
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture	-	-	-	5	6	1	-	-	12	8	-	20
Division of Life Sciences	-	-	1	4	6	1	1	1	14	10	-	24
Division of Research and Laboratories	-	-	1	5	6	8	2	1	23	16	-	39
The Agency's Laboratory	-	-	-	5	12	6	5	2	30	52	22	104
The Monaco Laboratory	-	-	-	1	3	1	-	3	8	11	-	19
International Centre for Theoretical Physics	-	-	-	1	1	3	-	-	5	17	-	22

TABLE 9 (Cont'd)

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-Total	GS	M&O	Total
Department of Safeguards and Inspection	-	1	-	1	2	1	-	-	5	5	-	10
Division of Development	-	-	1	7	10	3	1	-	22	9	-	31
Division of Operations	-	-	1	11	19	29	14	-	74	21	-	95
Department of Technical Assistance and Publications	-	1	-	-	-	1	1	-	3	7	-	10
Division of Technical Assistance	-	-	1	7	8	2	1	1	20	30	1	50
Division of Publications	-	-	1	1	1	5	4	4	16	87	26	129
Department of Technical Operations	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Safety and Environmental Protection	-	-	1	9	8	3	-	-	21	13	-	34
Division of Nuclear Power and Reactors	-	-	1	11	6	3	2	-	23	14	-	37
Division of Scientific and Technical Information	-	-	1	3	8	7	7	7	33	62	1	96
TOTAL	1	5	19	94	129	113	50	27	438	553	167	1158

Source: The Agency's Budget for 1974 (Vienna, International Atomic Energy Agency, 1973), p. 102.

TABLE 10

SAFEGUARDS: MANPOWER FOR THE PROGRAMME
Summary of Manpower by Grades of Staff

Grade of Post	Number of established posts				
	1972 Revised	1973	1973 Adjusted	Change	1974
DG	-	-	-	-	-
IG	1	1	1	-	1
D	2	2	2	-	2
P-5	20	18	18	1	19
P-4	28	28	28	3	31
P-3	26	26	26	7	33
P-2	14	12	12	3	15
P-1	2	-	-	-	-
Sub-total	93	87	87	14	101
GS	33	33	33	2	35
M & O	-	-	-	-	-
TOTAL	126	120	120	16	136

Source: The Agency's Budget for 1973 (Vienna, International Atomic Energy Agency, 1973), p. 72.

The various tables included provide an overview of the structural context within which the IAEA conducts the bulk of its efforts to devise and administer an international control system to monitor the peaceful nuclear activities of individual sovereign states. Before discussing the nature of the decision-making which transpires in this context and in the broader realm of the Agency as a whole, several observations regarding various limitations and characteristics ent in this structural context are in order. Once again, while it is difficult to pinpoint the precise effect which certain structural characteristics of the Secretariat have had on the nature of international safeguards policy as it has developed over the years, it is nonetheless important to note those characteristics which have played a dominant role in shaping the international organizational context within which this policy is formulated.

One of the factors which has had a major impact on the structure of the Secretariat in general and the Safeguards Department in particular, is the provision included in the Statute of the Agency requiring that Agency staff be recruited "on as wide a geographical basis as possible."[63] While the Agency has earnestly sought to be faithful to this requirement, insuring equitable geographical distribution of personnel in the Safeguards Department has proven difficult at best, for many of the less-developed member-states of the Agency either do not have personnel adequately trained in this specialized field or are reluctant to part with any one of the few technically trained individuals who are available

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[63] IAEA Statute, Article VII.D.

but whose talents are desperately needed in their own nations. Consequently, much of the Agency's staff in the Safeguards Department has been recruited from the more advanced member-states, a pattern which could have helped to reinforce the perception of developing nations that safeguards policy is predominantly the concern and domain of developed states. As a footnote to this point, it should be noted that broad geographical recruitment of Agency personnel has resulted in a variety of difficulties for the Agency, including circumenting linguistic and cultural barriers, and has created special problems for Agency personnel, who frequently feel isolated and cut off from the security of familiar surroundings and customs. These difficulties are not unique to the IAEA, and have been discussed elsewhere in relation to a variety of international organizations.

As Table 9 exemplifies, one of the elements included in the structure of the Secretariat, including the Department of Safeguards, is a hierarchical ranking of personnel, with a clear distinction between professional and service staff. Interviews with Agency personnel indicate that each position in this structure is accompanied by clearly defined duties and responsibilities. Clear-cut lines of authority prevail, as do established channels of communication. Those who are members of the Secretariat bureaucracy generally seem to have a sense of position within the total structure. Authority and power are clearly associated with position in this structure and the preponderance of power is located at the upper levels of the structure. One effect of this clear-cut delineation of authority is to buffer the Agency from external intrusions; any attempt by

an outsider to initiate contact with the Agency or gain access to its staff will find his or her efforts directed to defined channels within the organization. A second effect of this clear assignation of authority is to clarify levels of responsibility for Agency policies and programs and insure that, as a rule, some member of the Secretariat can be held accountable for a given problem. Moreover, clear assignment of responsibility and authority and defined channels of communication within the Secretariat tend to provide at least formal means of accessibility to the Agency for member-states.

Safeguards and Agency Decision-Making

The General Conference

The nature of decision-making is a function of many variables, including the environment in which it transpires, the nature of the decision-makers, and the issue or situation necessitating the decision. In the case of the General Conference, decision-making tends to be general rather than specific, formal rather than informal, and analytic rather than political.[64] That is to say, given the infrequency and brevity of Conference meetings, the rapid turnover of national delegates each year, and the complexity of many of the programs and policies pursued by the Agency, it is impossible for the General Conference to function as a dominant decision-making organ of the Agency. Traditionally the annual meetings of the Conference have tended to emphasize the exchange of information rather than the determination of detailed Agency policy.

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[64] Scheinman, "The International Atomic Energy Agency," pp. 1-10.

When deliberation has necessitated a vote on a particular resolution, parliamentary procedure has prevailed, and voting has generally been orderly. Despite general adherence to a model of formal parliamentary procedure, majority rule and rational, informative debate, however, the General Conference should not be regarded solely as a quiescent forum for scientific discussion. Past debate has frequently been lively and occasionally acrimonious. While political differences are generally muted during Conference meetings, they have surfaced on occasion.[65] Moreover, while the structure and composition of the Conference precludes the possibility of this body acting as a dominant decision-making force within the Agency, this forum does provide inputs into the decision-making mechanisms of the Board of Governors and the Secretariat in the form of requests and demands for policy initiatives, changes, or emphasis. Thus, while it does not serve as a major and consistent force in Agency decision-making, the potential leverage of the General Conference in the decision-making process cannot be discounted or ignored.

The Board of Governors

Among the various qualities which characterize the approach to decision-making utilized by the Board of Governors, perhaps the most outstanding is the tendency of the Board to rely on consensus-building. This approach has had the effect of muting political divisiveness and has tended to enhance the effectiveness of the

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[65]Scheinman, in Cox and Jacobson, pp. 224-238.

Board as a decision-making body.

> Another trend has also developed through the years: the Chairman waits to feel the consensus of the Board, thereby eliminating voting procedures. Points of contention are, in practice, discussed as much outside the meetings as inside. Discussion may be adjourned, an item postponed, time for reflection is allowed and when the matter comes up again for discussion, the Chair begins to feel the contour of the consensus that is slowly but surely taking shape. After a second or sometimes third discussion a final consensus may emerge--it is usually the result of a compromise which maintains a constructure approach to the problem under consideration and tries to take into account as large a spectrum as possible of the views expressed, bowing here to the international facts of life, and even recognizing directly opposing attitudes.[66]

An excellent example of this tendency of the Board to build consensus and achieve, as mush as possible, unanimity in its policy decisions can be found in the records of the Board's meetings in February and May, 1970. At this time, the Board was engaged in analyzing the responsibilities of the IAEA in regard to the Non-Proliferation Treaty, which went into effect in March, 1970. Of primary concern at this time was a proposal set forth by the United Kingdom of Great Britain and Northern Ireland to establish a committee to consider "the implications of the Treaty for the Agency's activities in relation to safeguards, and in particular on the desirable content of the agreements which will be required in connection with the Treaty . . ."[67] As the following excerpt illustrates, Board members relied on postponement of discussion and compromise to help

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[66]"The Board of Governors, 1957-1973," IAEA Bulletin 15, no. 4 (1973), p. 30.

[67]IAEA GOV/1383, 23 February 1970, p. 4.

shape an eventual consensus regarding the establishment of the Safeguards Committee.

(d) THE AGENCY"S RESPONSIBILITIES IN THE LIGHT OF THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS: PROPOSAL FOR ESTABLISHMENT OF A COMMITTEE (GOV/1383, 1387) (continued)

1. -----(United Kingdom) said that in the light of remarks made by several Governors it seemed that the area of consensus on the complicated question before the Board was perhaps somewhat narrower than the Chairman had suggested at the previous meeting.

2. It did appear, however, that the Board had reached a consensus on two points, namely that discussion should be postponed in order to allow certain Governments more time to consider the draft resolution in document GOV/1383, as amended by document GOV/1387, and secondly, that a committee of the whole should be established to consider the implications of the Treaty on the Non-Proliferation of Nuclear Weapons for the Agency's responsibilities in relation to safeguards. Clearly, no consensus had been reached with respect to the precise terms of reference of such a committee.

3. The best course was therefore to adjourn discussion of the draft resolution in order to allow Governors time to formulate their views on it. The United Kingdom delegation considered that an adjournment of two weeks would be long enough and hoped that the delegation of the Soviet Union would be able to agree to that.

4. The Chairman had suggested that the Board might be prepared to discuss the item at a meeting, perhaps in April, at which Member States not represented on the Board would be free to be represented under Rule 50 of the Provisional Rules of Procedure. Apparently, however, there was no general agreement on that course of action; many delegations would regard such special arrangements as tending to prejudge a decision on the draft resolution.

5. He proposes, therefore that further discussion of the draft resolution be adjourned for about two weeks.

6. -----(United States of America) recalled that he had consistently stated a preference for holding the next meeting of the Board during the week beginning 30 March.

7. -----(Union of Soviet Socialist Republics) said that, taking into account the opinion of the Chairman and of the Secretariat with respect to the preparations required for the meeting, he considered 10 or 15 April acceptable.

> 8. -----(Uruguay) remarked that it was difficult for some Governments to send representatives to Board meetings at frequent intervals. The greatest goodwill had been shown in accepting postponement of the discussion in order to reach a consensus. It was hoped that those who favoured postponement, recognizing the economic limitations of some Member States, would display similar goodwill by agreeing to meet again in two weeks.
>
> 9. -----(Italy) said that the delegate from Uruguay had made a legitimate point. If the next meeting were held within two or three weeks, those who wished to do so could stay in Vienna to finish the job in hand.
>
> 10. The CHAIRMAN wondered whether Wednesday 1 April, a date roughly midway between the extremes that had been suggested, would not offer an acceptable compromise. If there were no observations to the contrary, he would take it that the Board could agree to resume the discussion at 3 p.m. on that day. It would seem logical to defer consideration of the arrangements for the Board's meetings in June until after that discussion had been completed.
>
> 11. It was so agreed.[68]

The past capacity of the Board to rely on consensus-building as a key element in its approach to decision-making has been reinforced by a number of variables, the most noteworthy of which include the level of interest of member-states in Agency activities, the corresponding role of permanent representatives, and the sources of influence within the Agency. While these factors have been discussed elsewhere,[69] it may be useful to review briefly their relevance here.

As Scheinman has noted, "activity in any form is related to interest and the IAEA, as a rule, has been of only marginal interest

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[68] IAEA document GOV/OR. 426, 22 May 1970, pp. 3-4.

[69] See Scheinman, in Cox and Jacobson, pp. 238-262.

to a large segment of its membership."[70] Consequently, a relatively small number of the member-states of the Agency have historically taken an active role in Agency activities; more often than not, these states have tended to be members of the Board. And, more often than not, these states have had de facto permanent seats on the Board.

As a corollary to this point is the importance of a member-state's permanent delegation to the Agency. As Scheinman has observed,

> Approximately one-half of the Member States have permanent representatives to the IAEA, but this is a highly inflated reflection of reality. Only a dozen or so states, largely the permanent Board members have a full time resident representative and only two states, the United States and the Soviet Union, have complete missions. Sweden and France, for example, each have "half a man" in Vienna. The role of the permanent representative varies considerably and it is difficult to generalize in any categorical manner about their latitude of independent action beyond saying that on secondary issues the permanent representatives appear to have a relatively free hand and that this does not appear to vary significantly between different types of states. One thing is clear, however: presence in Vienna is an important factor, especially since the Agency style of operation has shifted from frequent and lengthy Board meetings to a pattern of continuous informal consultation between Member States and between the latter and the Secretariat. One essential function performed by the resident representatives is to keep momentum up and to keep problems down.
>
> Government representatives as a group are the most important participants in the decision-making process of the Agency. They are relevant to at least some degree in all decision-types and predominant in most. There are, of course, differences between governmental representatives

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70. Scheinman, "The International Atomic Energy Agency," pp. 59-62.

> and one of the distinguishing criteria for influence is representation on the Board of Governors. This is true not merely because the statute vests authority in the Board to carry out the functions of the Agency but also because the Board is de facto the seat of power in the IAEA. The possibility of a non-Board member exerting influence in the Agency is not, of course, ruled out but this very likely would be a sporadic rather than a continuous type of influence exercised through a surrogate on the Board. The limitations to this medium for exerting influence are obvious.[71]

As the above excerpt suggests, a high level of interest in Agency activities tends to correlate with maintenance of a permanent resident representative to the Agency and membership on the Board of Governors. Thus, the Board tends to be made up of members with a common active interest in promoting Agency activities and reinforcing the viability of the organization. Moreover, many faces are familiar ones, with turnover of representatives from de facto permanent members of the Board relatively low. There has existed, therefore, a rather stable core of Board members from varying political backgrounds, but with a common interest in supporting the programs of the Agency, who are familiar with the strengths and weaknesses of the Agency, who are aware of personal bonds and differences and who are familiar with working together. The interaction of all of these considerations combines to reinforce the capacity of the Board to arrive at decisions on the basis of compromise and consensus.

It should also be noted that ability to exert influence within the Agency is linked with the considerations discussed above. While as Scheinman notes, sources of influence within the Agency

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[71] Ibid., pp. 59-60.

have varied over time, he also states,

> given the informal, consultative consensus-building style of decision making that characterizes the Agency, certain resources . . . become of evident importance: permanent presence in Vienna, continuous active interest in Agency work, access to influential decision-makers, long association with the Agency, and personal qualities. Permanent representation of an active, interested state virtually ensures consultation and participation.[72]

In sum, then, several factors interact to produce a discernable pattern of decision-making based on consensus-building within the Board of Governors. The importance of this pattern of decision-making for the evolution of safeguards policy within the Agency is incalculable. Given the political and economic implications of safeguards policy, it would not have been unthinkable if a member of the Board had attempted in the past to retard or prevent the development of the Agency's safeguards policies. However, the elements which have combined to produce consensus rather than divisiveness as a dominant characteristic of the Board's approach to decision-making--the commonality of interest in the work of the Agency, the de facto permanent representation on the Board of certain advanced nuclear states, the provision for permanent representation of several of these states to the Agency, and the shared perception, notably between the superpowers, of the need for an effective international safeguards system--have enabled the Board to perpetuate its basic policy of promoting the development of safeguards policy. The effect which the recent change in the size and composition of the Board will have on the Board's position

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[72] Ibid., pp. 61-62.

vis-a-vis safeguards policy is, at this time, unclear; as previously observed, this change could result in an increased emphasis on policies of concern to developing nations.

The Secretariat

Decision-making in the Secretariat of the Agency occurs at least two levels: the routine bureaucratic level, and the professional policy making level. These levels correspond to the division of Agency personnel into two broad categories, service and professional, as indicated in Tables 9 and 10.

Routine, bureaucratic decision-making in the Secretariat as it has evolved over the years relates to the mechanics of maintaining and operating the Agency. It includes decisions concerning matters such as Agency publications, the scheduling and organization of meetings and conferences sponsored by the Agency, maintaining routine communications with member-states, and providing secretarial services for the professional staff of the Agency. At this level of decision-making, the Agency closely approximates Graham Allison's organizational processes model in some respects. Established routines for the preparation and processing of reports, publications, mailings, and the like are followed and maintained. Attention is limited to the problem at hand; materials are processed sequentially in accordance with defined deadlines. Change is slow; uncertainty is minimal. Acceptable levels of performance are defined for each staff position. At this level one discerns little initiative regarding substantive policy, and little bargaining regarding policy content or change. On the other hand, however, as a result of the

clear division of Agency staff into two categories--service and professional--one would not expect to find a great deal of activity regarding substantive policy at the level of service personnel. The set of expectations attached to each position at the service level is concerned with the fulfillment of those tasks which will enable the Agency to engage in routine day-to-day operations. Policy initiatives and articulation are a part of the defined domain of professional level personnel.

At the level of the professional staff of the Agency, decision-making is concerned primarily with policy formation and implementation. The professional staff of each of the five Departments of the Agency represents the hard core of those who define the policies of the Agency. Aided from time to time by various temporary committees or panels of experts, these people are responsible for the basic research and drafting of the proposals and alternatives which, if formally approved by the Board of Governors and the General Conference, become part of the broad spectrum of activities pursued by the Agency. Moreover, some members of the Agency's professional staff act as overseers or participants in the implementation of many of the Agency's programs.

Application of Allison's organizational processes model to this level of Agency decision-making offers interesting insight into the policy formation process. If we regard policies such as safeguards or technical assistance programs as tasks or problems requiring action or solution, we can see, from Table 6, that the organization is structured as a compartmentalized problem-solving mechanism, with each major topic or task dealt with by an

identifiable branch of the Secretariat. Within this fractionated structure each unit is concerned with specific tasks or problems which are distinct from those of each other unit. Thus each unit deals with defined programs or repertoires of action and does so in accordance with established routines in an atmosphere of minimal uncertainty. Publications of the Agency provide some evidence indicating that the gradual evolution and development of Agency programs, with a corresponding definition and refinement of routines for implementing these programs have been a major characteristic of the Agency's development since its inception.[73]

With specific reference to the Department of Safeguards, Table 7 indicates that this department is structured to facilitate both routine operation and implementation of existing safeguards programs by the Operations Division, and organizational search for new policy alternatives by the Division of Development. Coordination of function for these two divisions is performed by the Section for Standardization and Administrative Support. Thus, to a certain degree, international safeguards policy can be regarded as organizational output, with the on-going daily details of safeguards implementation comprising the repertoire of the Division of Operations, while the refinement, modification and general development of this policy constitutes the repertoire of the Division of Development.

The perception of safeguards policy as organizational output

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[73]See, for example, "past, present and future," IAEA Bulletin 13, no. 6 (1971), pp. 2-9.

is also reinforced by the slow rate of evolution which has characterized this policy. As we have seen, the initial safeguards policy of the Agency (see Appendix 1) was modest in content and scope; subsequent expansion of this policy was tentative and slow. While this slow rate of evolution was in large part due to conditions in the international political environment of the Agency, it may be that this pace of evolution can also be explained in part by the underdeveloped state of the Agency itself during the late 1950s and early 1960s. The fledgling structure of the Agency was barely established at the time the first safeguards document was approved by the Board of Governors. Routine procedures for dealing with the implementation of safeguards had yet to be defined and established. Thus, to some degree, the evolution of safeguards policy seems to correlate with the evolution of the organizational context with which it is associated.

Finally, the perception of safeguards policy as organizational output of the Agency seems to be reinforced by the relative absence of political bargaining and controversy vis-a-vis this policy within the Safeguards Department. While safeguards policy has generated a considerable degree of controversy in forums outside the Secretariat, within the confines of this body and the Safeguards Department in particular, little bargaining or jockeying for an advantaged policy position is discernable. There is some indication of rivalry among the various departments of the Agency--some staff members in other departments of the Secretariat have expressed doubts regarding the utility of efforts in the Safeguards Department to develop safeguards policy. (One Agency staff member termed the efforts of the

Safeguards Department totally useless.) Within the Safeguards Department itself, however, a routine sense of "business-as-usual" seems to prevail. At least two explanations appear to account for the apparent absence of intra-departmental competition and bargaining. Clearly, members of the professional staff of the Safeguards Department have little reason for feeling any sense of long-term personal involvement with Agency safeguards policy, for the majority of these staff members will complete a brief tour of duty with the Agency and return to their own nations to pursue long-term careers. Hence the reward of being a good "organization man," namely, receiving a good service report at the completion of a term in Vienna, provides an incentive for dutifully fulfilling the tasks assigned by the organization. Moreover, like the other departments of the Agency, the Safeguards Department is hierarchically structured, and authority and influence are associated with the positions at the top of this hierarchy. Thus the lower ranks of the professional staff serve as a source of consultation and information for those in the higher positions. Interviews with Safeguards Department personnel indicate that substantive policy formation and decision-making occurs at the upper levels of the professional staff hierarchy, while research and program implementation are the preserve of the lower levels of this hierarchy.

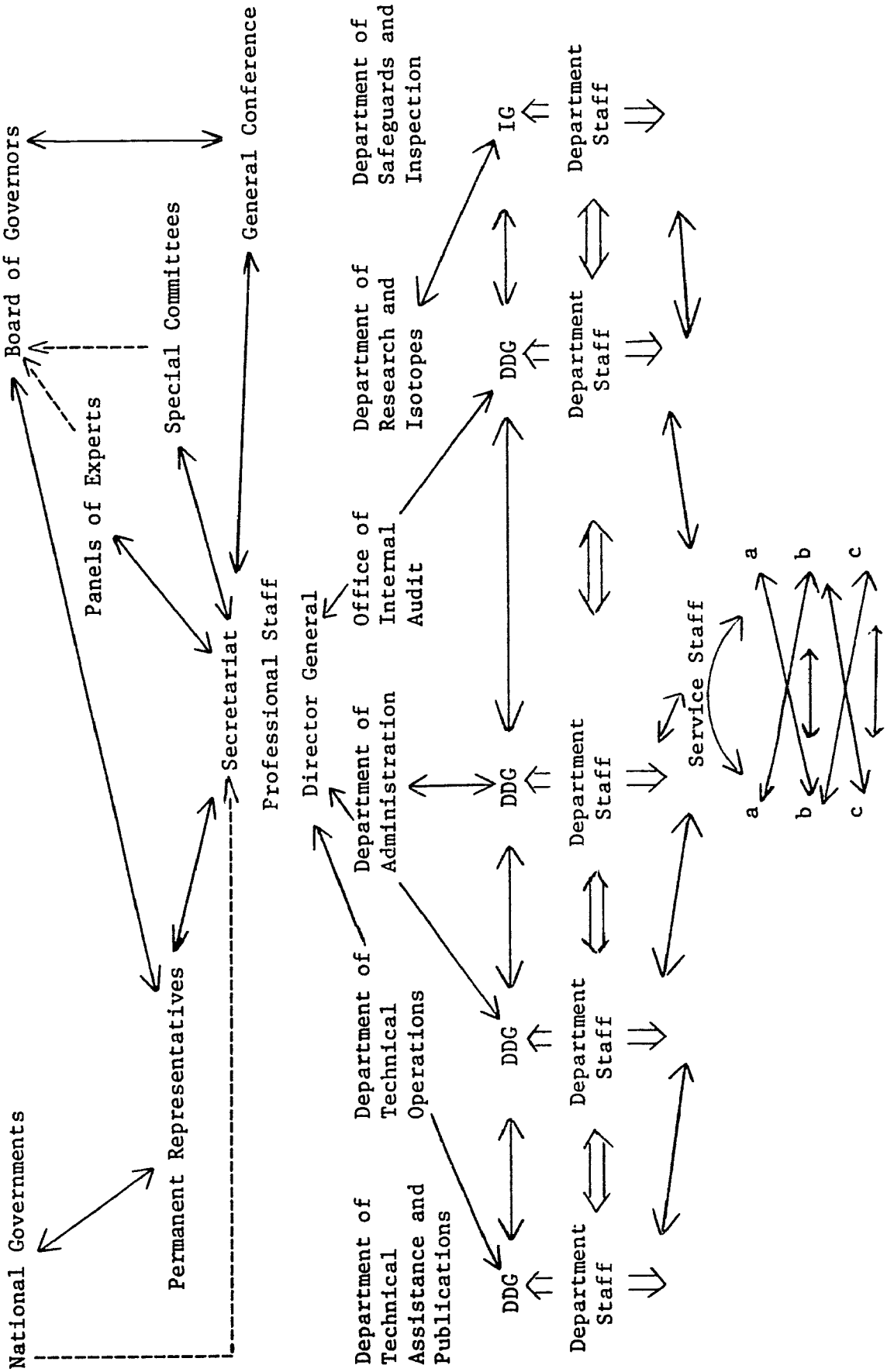
Finally, it should be noted that the potential for the personnel at the service level of the Agency to intervene or influence the policy formation process at the professional staff level appears to be minimal. Several elements combine to minimize the likelihood that action taken at the service level of the organization will have any

significant impact--other than usual bureaucratic delays and hassles--on the professional staff. These elements include: 1) the clear delineation in the Agency between service and professional personnel; 2) the clear definition of roles within the hierarchy of Agency staff and the explicit assignment of policy research and policy formation tasks to professional staff members; 3) the special expertise required to engage in policy research and formation within the Agency, and; 4) the flow of communications within the Agency which enables professional staff members to communicate with each other as well as with groups and individuals outside the Agency without necessarily working through service level personnel, thus minimizing potential for distortion. Table 11 provides a rough depiction of the communication flows of the Agency.

The assertion that safeguards policy can be regarded at least in part as organizational output of the IAEA must be accompanied by certain caveats. First, while safeguards policy may have evolved at a pace correlated with the evolution of the organizational structure and apparatus of the Agency, the primary factor determining the extent and nature of the evolution of this policy is undoubtedly the degree of support provided by the member-states of the Agency, notably the superpowers. Second, given the political implications of safeguards policy, the IAEA has had little choice except to emphasize the routine stable aspects of its safeguarding functions, for any strong attempt by the Agency to expand its safeguarding role would undoubtedly encounter equally strong opposition from many nation-states. Thus, the nature of safeguards policy is such that it may be less the output of organizational processes than it is a

TABLE 11

COMMUNICATION FLOWS OF THE AGENCY



major determinant of the nature of these processes. Finally, it should be reiterated that although the Secretariat--and principally the Safeguards Department of the Secretariat--is the originator of many of the Agency's concepts and practices regarding safeguards, policy initiatives and proposals in this realm have also come from a number of other sources, including the Safeguards Committee of 1970-1971, panels of experts, and permanent representatives to the Agency. Thus, some of the basic tenets of Agency safeguards policy have been formulated not by organizational processes but rather by forces outside of or peripheral to the organization.

Given these caveats, acceptance of the assertion that safeguards policy can be regarded in part as organizational output of the IAEA provides some degree of insight into the Agency and its capacity to function. As an organization with a statutory obligation to ensure broad geographical representation among its staff, and with a corresponding rapid turnover of personnel, the Agency is forced to rely on the clear definition and maintenance of organizational procedures and routines to ensure perpetuation of the Agency's safeguarding functions. Only in this way can the Agency maintain consistency in its safeguards efforts. Moreover, the clear definition of Agency procedures, with the implicit delineation of the parameters within which the Agency may legitimately function, provides a means whereby the Agency can reassure member and non-member states alike that it is not overstepping the bounds of its authority, but is operating within its allotted sphere to pursue the goals assigned to it by its members. The effects of Agency failure to provide a clear definition of its safeguards procedures

will be noted in Chapter IV.

Safeguards and Agency Personnel

In Chapter I, we noted that students of organization theory have devoted considerable attention to the study of individuals within an organization, focusing on matters such as the role of an individual within an organization, the impact which an individual has on the behavior of an organization, and the differentiation of organizational determinants from individual characteristics in the explanation of individual behavior within an organization. Here we are attempting to discern the extent to which individuals within an organization can have an impact on both the nature of the policies formulated and implemented by the organization and on the nature of the interaction which transpires between the organization and other organizations regarding implementation of a given policy. This attempt is based on the assumption that the behavior of an individual is a function of both the organizational context in which he or she works and his or her personal characteristics.

Organizational characteristics define the parameters within which an individual may function. The nature of these parameters and correspondingly, the dimensions of individual activity are a function of a variety of factors, the most noteworthy of which include:

(a) organizational role and position in the organizational hierarchy. The degree of specificity with which an individual's role within an organization is defined can have significant implications for both the individual and the organization. When a role is clearly

defined, tasks are specified and organizational expectations of acceptable performance regarding that role are clearly delineated; uncertainty regarding expected function and task fulfillment is minimized. Thus an individual fulfilling the expectations associated with his or her role may feel secure within this role, but may have little motivation or show little initiative for exceeding these expectations. If a person is over-qualified for the role to which he or she is assigned, a sense of boredom may prevail, for the specific definition of role responsibilities leaves little or no room for individual creativity. Organizational definition of role and the location of this role within the organizational hierarchy thus delineates the legitimate sphere of individual activity and establishes the constraints within which the individual must function.

(b) channels of communication. Communication, the flow of information within an organization, is the sine qua non of organizational existence. Thus, the definition of channels of communication or the absence of these channels provides both a vital link between segments of an organization and a means whereby individuals can attempt to tap the input flows of information into the organizational policy making process.

(c) access to policy makers. Few individuals can have an impact on organizational policy without access to those who define this policy. Access to policy makers can take a variety of forms, both formal and informal, and may come as a result of considerations such as position within the organizational hierarchy, or as a result of personal ties and friendships.

(d) influence. The elusive quality of influence has been defined and re-defined by students of organization theory in the attempt to capture the essence of this force. Here influence refers to the power possessed by those with the authority or potential authority to affect or determine the allocation of organizational resources both within the organizations and in the specific environment of the organization.

Within the realm delineated for him or her by the organization, the individual undertakes to perform the tasks alloted to him or her. The extent to which the individual seeks to actively affect his or her environment, and to have an impact on the policies and behavior or his or her organization is also a function of a variety of factors unique to the individual, the most noteworthy of which may be:

(a) level of expertise. At any given level of the organization, the extent to which an individual can affect a specific policy is at least in part a function of his or her level of expertise vis-a-vis the policy.

(b) perception of organizational role and potential for advancement. Even those individuals with expertise sufficient to permit them to submit policy recommendations or changes may hesitate or fail to do so if their perceptions of their organizational roles lead them to believe that action in this realm will jeopardize the security of their position. Perception of role, and corresponding expectations of rewards or penalties for behavior thus represent a strong determinant of the degree to which an individual will seek to exploit opportunities to influence the processes or policies of his or her organization. While the potential for advancement may be regarded

as a factor determined by organizational processes, individual perception of potential for advancement within the organization may be a more significant determinant of individual behavior than *de facto* opportunities for promotion.

(c) motivation. Much has been written about the importance of motivation as a major impetus behind individual performance levels, and the importance of this element--the desire to attain certain goals, achieve certain rewards, or escape certain penalties--needs only to be underscored here. Motivation and individual perception of role can be regarded as significant interactive determinants of individual behavior.

If we consider the three divisions of the IAEA with the above considerations in mind, to what extent does there appear to be potential for individual impact on policy formation and implementation within this organization?

The General Conference

Of the three divisions of the Agency, the General Conference appears to offer the least potential for an individual to play a significant role in policy formation or implementation. Many of the variables which limit this potential have been mentioned previously and need only be reiterated here.

Given the infrequency and brevity of Conference meetings, and the minimum of formal organizational structure characterizing this body, there is little need for any formal organizational definition of role and attendant expectations regarding performance. National delegations are regarded as equal in status and rank, and

individual delegates are regarded as representative of their respective countries rather than members of the organization. Individual activity regarding Agency affairs is generally limited to presentation of brief remarks at Conference meetings at best and generally involves merely sitting in at these meetings. Communications with and access to Agency policy makers during General Conference sessions is minimal or non-existent for most individual delegates (some individuals however, may have indirect or direct access to policy makers or to permanent representatives or members of the Board of Governors as a result of their normal career or occupational circumstances and may thereby have some opportunity for policy input in other capacities beyond that of Conference delegate). Control over Agency resources is limited for the majority of individual delegates to the reiteration of their government's position concerning the contribution of financial support to the Agency.

Many of the delegates to the annual meetings of the General Conference are prominent scientists well qualified to make suggestions and recommendations regarding specific aspects of some of the Agency's policies. Few of these delegates have a broad familiarity with the total range of Agency programs, however, and few are familiar with the administrative characteristics of the Agency. Moreover, for many of the delegates, their sojourn to Vienna is a once-in-a-lifetime undertaking. Thus, in addition to the structural and temporal limitations to individual activity inherent in the General Conference, there is little perception of need for or motivation for personal involvement in Agency affairs.

In sum, then, little opportunity for individual input into Agency policies and processes appears to be provided by the meetings of the General Conference. This is particularly true in relation to safeguards policy. The intricacy of the provisions of safeguards policy and the sophisticated technology associated with it inhibit an in-depth comprehension of this policy on the part of many national delegates. Of necessity therefore, their input into the creation and implementation of this policy is limited to general statements submitted through formal channels to substantive policy makers.

The Board of Governors

Unlike the General Conference, the Board of Governors provides some opportunity for individual involvement and impact on the formation of Agency policy. Indeed, according to formal prescription, the Board represents the policy making body of the Agency, and its members are, by definition, the policy makers for the Agency. In reality, however, the policy making functions of the Board are circumscribed to some degree by a variety of considerations. Because it is convened only four times a year, the Board is not involved with the on-going day-to-day activities of the Agency. The information supplied to the Board by the Secretariat is, of necessity, limited in detail and frequently inadequate for the specific delineation of substantive policy. Moreover, if one focuses not on the Board as a unitary actor but on the individuals who comprise this body, it is apparent that Board members represent a diversity of nations and interests and that the composition of

the Board changes to at least some degree each year. Rapid turnover of representatives from less developed states in the past has limited the potential for these individuals to play major roles in the policy making process; on the other hand, however, the de facto permanent Board seats held by some states enhances the potential for their representatives to maintain a long-term involvement with policy making. Finally, Board members are not necessarily versed in the specifics of Agency administration; Board discussions, therefore, may often be cast in terms of broad policy outlines and generalities rather than specific policy considerations.

Given these restrictions, Board members do have considerable potential to make individual contributions to the policy making process. Their organizational role as defined in the Agency's Statute involves policy formation. This formal definition of role is reinforced by the past activities of the Board and its history of active involvement with Agency policy. All channels of communication in the Agency can be tapped by the Board: it is free to request any information it desires. Access to the staff of the Secretariat and to fellow Board members is theoretically unlimited; the basic authority to determine the allocation of Agency resources rests with the Board.

In addition to organizational factors promoting individual involvement with Agency policy formation, individual incentives for action also appear operative. Many Board members have the expertise necessary to comprehend the intricacies of the Agency policies they must consider. Many perceive their position as Board members as a serious responsibility involving both gratifying

prestige and the requirement of accountability to other Board members and to their respective governments. Motivation to fulfill the expectations associated with their role can therefore be considerable, although in the case of representatives from less advanced countries with limited two-year tenure, it may also be fleeting. It should be noted here however, that the nature and dimensions of individual Board members' involvement with safeguards policy formation were not specified during the course of interviews in Vienna. Thus the remarks above refer to the potential for Board members to engage in policy formation but cannot indicate the extent to which this potential is utilized.

The Secretariat

Of the three branches of the IAEA, the Secretariat provides the greatest opportunity for on-going individual input into the policy making process. This statement must be immediately modified, however, for individual involvement with policy making within the Secretariat is inhibited by the relatively brief two-year tenure of many of the Secretariat's staff, and by the division of staff into service and professional categories. In general, those employed as service personnel by the Agency have minimal involvement with the substance of Agency programs. As a rule, the day-to-day gathering of information and drafting of policy propositions is the domain of the professional staff, and the organizational roles assumed by professional staff members are generally defined in terms of policy making responsibilities.[74]

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[74] See, for example, the vacancy notices published in the IAEA Bulletin, and the job descriptions included.

Several factors combine to reinforce the policy making functions of the individual members of the professional level staff of the Secretariat. The structure of the Secretariat is such that communication within each department between individual staff members is free and direct. Members of each department are generally available for consultation by their fellow workers; there is however, a definite and acknowledged hierarchical ranking of professional staff, with a corresponding tendency for upper level professional staff executives to be less accessible to lower level staff. Although influence to determine the ultimate shape of Agency programs rests with the Board of Governors in consultation with permanent representatives of various member states, the influence of the Secretariat's professional staff, particularly at the upper levels, on the form and content of these programs is considerable, for it is this segment of the Agency that supplies the information and alternatives essential in the policy making process.

It may well be that organizational considerations such as expectations associated with role, flows of information, and the influence derived from supplying the information and alternatives necessary for policy formation provide a greater impetus for individual involvement with policy making than do individual considerations. Clearly the members of the Agency's professional staff have the expertise necessary to draft Agency programs. Given the tendency for many lower level professional staff members to spend only two years with the Agency, and the limited potential for promotion within the Secretariat, there is little motivation for lower-level professional staff to seek to excel within their

roles beyond the performance level expected by the Agency. Thus, those individuals with both the organizational means and the individual desire to influence the content of Agency policies are generally the executive level personnel of the professional staff; only these individuals have sufficient tenure (one professional level executive has held his post since the inception of the Agency) and motivation to become deeply involved with the policy making process of the Agency.

Summary

In the analysis above the attempt has been made to delineate the organizational context out of which international safeguards policy has emerged. On the basis of this analysis it appears that several characteristics of the IAEA may have particular relevance for the development of this policy.

Given the omnipresent constraints imposed upon it by its external environment which serve to define the basic parameters within which Agency activity will be permitted by sovereign states, policy initiatives and influence within the Agency appear to be the domain of a relatively defined group of actors located either in de facto permanent seats on the Board of Governors or occupying the executive positions of the professional level staff of the Agency's Secretariat. The structure of the Agency appears to reinforce the pre-eminence of these two groups, as do standard operating procedures of the Agency which combine to minimize the potential of lower level professional staff or service personnel in the Agency to engage in long-term policy making activity.

The effects of delegating policy making to a relatively defined group are significant; the degree of continuity of membership in this group is far greater than that of any other grouping incorporated within the Agency, and thus provides a relatively stable basis for consideration of policy alternatives. Moreover the continuity of membership in this group enables members to form personal ties, to become familiar with opposing viewpoints, and generally to engage in informal discussion which serves to facilitate development of a pattern of decision-making based on consensus. The existence of an identifiable group of decision-makers creates a distinct focal point for member states seeking to affect Agency policy.

As the above analysis has attempted to indicate, the international organizational context within which safeguards policy has developed has had a definite impact on the nature of this policy. The IAEA has provided the mechanism for the active promotion and development of this policy. Within the boundaries defined by international political reality, an identifiable group of policy makers has consistently labored to develop and refine this policy. It may be that the status of this group within the hierarchy of the Agency has served to reinforce the legitimacy and stability of the development of international safeguards. The extent to which certain characteristics of the Agency--such as an emphasis on organizational variables in delineating the roles of lower level professional staff--have had an effect on the implementation of international safeguards will become more apparent when we examine organizational interaction between the IAEA and the Japanese in

Chapter IV. Before we turn to an examination of this interaction, however, it is necessary to delineate the nature of this national organizational context, with which the IAEA has had considerable dealings.

CHAPTER III

INTERNATIONAL SAFEGUARDS AND THE JAPANESE ORGANIZATIONAL CONTEXT

In Chapter II, attention was directed exclusively to the international organizational context out of which international safeguards policy has emerged. The formation of international safeguards policy however in no way guarantees the subsequent implementation of this policy, for while safeguards policy formation can occur within the confines of the IAEA, implementation of this policy necessitates interaction between the Agency and the nation-states which have chosen to submit to safeguards. This interaction takes the form of contact between the Agency and specific organizations within each state accepting Agency safeguards. Here we shall turn to an examination of a national organizational context with which the Agency has had considerable experience in its on-going attempts to develop and implement international safeguards, namely, the Japanese national context. We are interested in attempting to clarify the nature of this organizational context, so that we may be in a better position in Chapter IV to analyze the interaction which has occurred between the IAEA and the Japanese regarding international safeguards and assess the implications of this interaction for the future of the IAEA and its involvement with safeguards policy.

PART ONE

The Environment Underlying Japanese Organizational Involvement with Safeguards

In Chapter I it was suggested that the nature of the contact or interaction between an international organization and national organizations is shaped significantly by the nature of the organizations involved, specifically by their structure, techniques of decision-making, and their personnel. Organizations are assumed to be open systems and organizational behavior is motivated in part by the pursuit of organizational goals. The nature of these goals and the organizational strategies created to pursue them are multiple and are subject to constraints imposed by the environment within which an organization is operative.

The involvement of specific Japanese organizations with international safeguards is neither haphazard nor arbitrary, but rather results from the deliberate pursuit of policies related to the general goal, defined by the Japanese government, of nuclear development in Japan. This pursuit transpires within an environment shaped by both the nature of Japanese domestic circumstances and by conditions prevailing in the international system of which Japan is a part. Comprehension of the nature of Japanese organizational involvement with international safeguards is predicated upon awareness of at least some of the traits characterizing this environment; before focusing specifically on the organizations in Japan which are involved with safeguards, let us look briefly at some of the considerations which underlie and shape this involvement.

The pursuit of nuclear development as a defined goal motivating involvement of specific Japanese organizations in the nuclear arena had its origins in the 1930s, in prewar Japan. Preliminary research begun in this realm was interrupted by the outbreak of war, however, and attention shifted to the pursuit of military policies. Of the various consequences which emerged in the aftermath of Japan's devastating defeat in 1945, two had particular importance in shaping the nature of postwar Japanese life, namely, the almost seven year Allied Occupation of Japan, and the extensive damage suffered by the Japanese economy.

The tremendous impact which the Allied Occupation, led by General Douglas MacArthur and staffed primarily by Americans, had on the nature of postwar Japan cannot be overemphasized. The specific programs and policies of the Occupation have been expertly discussed elsewhere;[1] suffice it here to say that during the course of their stint in Japan, the Supreme Command of the Allied Powers (SCAP) vigorously pursued the twin goals of demilitarization and democratization. In so doing, they touched and altered virtually every aspect of Japanese life. As Robert Ward has noted,

> . . . This was no ordinary military occupation with goals limited largely to the spheres of disarmament and reparations. It was realized from the outset that an effective program of democratization involved far more than changes at the statutory and institutional level. And, as SCAP became more involved in the endeavor, its agenda of action tended continuously to expand. As a consequence, SCAP at one time or another became heavily involved in: the purge of

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[1] See Robert E. Ward, "The Legacy of the Occupation," in Herbert Passin, ed., The United States and Japan (New Jersey, Prentice-Hall, 1966), pp. 29-56.

> upwards of 200,000 individuals from public office or the possibility of acceding thereto; the writing of a completely new constitution; the drastic decentralization of what had been a highly centralized system of government; a complete reform of the entire national and local civil service; an attempt to establish a new democratic system of political parties and to regulate abuses associated therewith; the introduction of a completely new concept of civil rights, human rights, the rights of women, and the rights of labor; a deliberate inversion of the theoretical position and powers of the Emperor; the dissolution of the system of giant cartels, known as the zaibatsu; the drastic reform of the land tenure system; the promotion of labor union organizations and collective bargaining; stringent control of credit and inflation; a total reform of the educational system from kindergarten through graduate school; an attempt to substitute the Latin alphabet for the traditional writing system; campaigns to eliminate tuberculosis and other epidemic diseases; and even an attempt to persuade the Japanese to give names to at least the main thoroughfares in their major cities. This is a highly selective list that could easily be multiplied many-fold. There were few aspects of the culture that SCAP did not in some degree become involved with. It was a saturation-type operation.[2]

During much of the course of the postwar Occupation, Japanese contact with other nations was minimal. Most of Japan's diplomatic relations had been broken as a result of the war, and the little interaction which transpired between Japan and other nations in the late 1940s was strictly monitored by Occupation personnel. For a people suffering deeply from the physical and psychological effects of defeat, this virtual isolation of Japan from the international community may have been greeted with some measure of relief, for it gave the nation as a whole time to adjust to the numerous consequences of their ill-fated military endeavor. Moreover, it

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[2] Ibid., pp. 29-35.

enabled the Japanese to devote their attention and energies to the internal reconstruction of the country and to the rebuilding of their badly damaged economy. With their political fortunes largely in the control of outside forces, with the virtual elimination of all military capability, and with international contact at a minimum, emphasis on economic recovery and economic development became a logical raison d'etre for a significant proportion of the Japanese population.

While the Allied Occupation of Japan officially terminated on April 28, 1952, many of the policies and reforms initiated by Occupation forces continue today to have an impact on Japanese life. Of the various issue-areas which continue to manifest the residual effects of Occupation policies, three are particularly salient, and include: 1) the postwar relationship between Japan and the United States; 2) the nature of Japanese defense policy, and; 3) the articulation of the Japanese role in the international system. Each of these issue-areas is intimately related to the others, and each has been to varying degrees a source of on-going controversy and debate in postwar Japan. Of the three, however, perhaps the one which has had the greatest impact on both domestic and foreign policy discussions and policy content in Japan is the nature of the postwar relationship between Japan and the United States; for by the end of the Occupation period, Japan had been firmly linked to the United States and was dependent upon the United States for both national security and economic aid.

Of the various policies initially implemented by the Allied Forces in Japan, none was pursued more vigorously in the early

days of the Occupation than that of the demilitarization of Japan. Japanese troops were quickly demobilized and every type of equipment and social institution which could conceivably contribute to the resurgence of militarism in Japan was destroyed or restructured. In part in conjunction with this drive for demilitarization and in part to provide a legal basis for democratic reform, SCAP Headquarters issued a directive for the drafting of a new constitution. Of the various reforms initiated by the Occupation certainly none has engendered more controversy among the Japanese than has the Constitution promulgated on March 6, 1947. While the extent to which this document is a product of the efforts of Occupation personnel as opposed to Japanese officials has long been a subject of debate among scholars, there is fundamental agreement that the most controversial article of this document--Article IX--was inserted as a result of direct intervention by General MacArthur. According to this provision,

> Aspiring sincerely to an international peace based on justice and order, the Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as a means of settling international disputes.
>
> In order to accomplish the aim of the preceding paragraph, land, sea and air forces, as well as other war potential, will never be maintained. The right of belligerency of the state will not be recognized.[3]

The pursuit of a vigorous policy to eradicate the physical means of warfare by SCAP together with the sponsorship of a Constitution

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[3]As cited in George R. Packard III, Protest in Tokyo: The Security Treaty Crisis of 1960 (New Jersey, Princeton University Press, 1966), p. 20, footnote 27.

renouncing war combined effectively to eliminate all visible signs of military capability from Japan and left the nation almost completely disarmed and defenseless.

The intensifying hostility between the United States and the Soviet Union which was increasingly apparent by the end of the 1940s, together with the outbreak of the Korean War in 1950 caused the United States to reappraise the policies pursued by the Occupation in Japan and led to the articulation of the belief that a strong United States ally in the Pacific was essential to United States security. Consequently SCAP personnel began to apply pressure on the Japanese to rearm--an undertaking which the Japanese, with an understandable degree of perplexity, argued was in direct contradiction to their new Constitution. United States pressure continued however, and was a primary motivation behind the formation in 1950 of a National Police Reserve of 75,000 men, which became the basis for Japan's postwar army.[4]

The perception by the United States government of the need for Japan to serve as a strong United States ally in the Pacific has been fundamentally unchanged since the late 1940s, and United States pressure on the Japanese to develop a strong military capability has been applied with varying degrees of intensity since that time. For a number of reasons, including initially a profound anti-war sentiment in Japan and a desire to adhere to the new Constitution, and subsequently an emphasis on the need for capital investment to further economic growth rather than investment in costly military

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[4] Ibid., p. 20.

equipment, the Japanese have been slow to expand the scope of their armed forces. Meanwhile the Japanese government has consistently reiterated Japanese reliance on the postwar security treaties[5] concluded between the United States and Japan as well as reliance on the so-called "nuclear umbrella" of the United States as the cornerstones of Japanese defense policy.

The degree of Japanese dependence upon the United States created by Japanese reliance on United States military force as a primary basis for Japanese national security was reinforced by the need for United States economic aid in the 1950s to facilitate post-war economic recovery. By 1951 this aid totalled over $2 billion; throughout the 1950s the United States continued to provide massive assistance to the rapidly recovering Japanese economy. This aid was accompanied by the establishment of close trade relations between the two countries which until the waning years of the 1960s typically showed a balance significantly in favor of the United States.[6]

The degree of Japanese dependence on the United States, initiated during the Occupation and perpetuated through both the postwar security treaties concluded between the two countries and through the close economic ties of trade which have developed in the postwar era, has had profound implications for Japanese attempts to define a role for their nation in the realm of international

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[5]See Ibid., passim, for a discussion of these treaties.

[6]See William W. Lockwood, "Political Economy," in Passin, ed., pp. 93-129.

interaction. During the 1950s, ties of trade and security with the United States were more a source of reassurance than apprehension for most Japanese; there was little question as to Japan's alignment in the predominantly bipolar international system. A number of events which transpired in the 1960s and first half of the 1970s has led an increasing number of Japanese to question the nature of their country's relationship with the United States, however, and the question of defining Japan's role in the international community is becoming a subject of increasingly heated debate among Japanese officials and citizens alike. Among the most notable of the events fueling this debate are:

1) The emergence of Japan as an influential economic power and the transformation of the economic relationship between Japan and the United States.

As noted above, Japan became closely linked to and dependent upon United States economic aid and trade relations in the aftermath of the Allied Occupation. With the recovery and phenomenal growth of the Japanese economy in the 1950s and 1960s, however, the disparity in the level of development of the United States and Japanese economies began to equalize. By 1972, Japan had a $4.2 billion trade surplus with the United States, which was roughly two-thirds of the total United States trade deficit,[7] and United States officials and businessmen expressed dismay and alarm at the increasingly apparent strength of the Japanese economy.

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[7] J. Rey Maeno, "Japan 1973: The End of an Era?," Asian Survey 14, no. 1, p. 58.

Surfacing sources of friction in the economic dealings of the two countries were multiple. Japan's postwar "economic miracle" had been accomplished in part through an intense on-going search for the raw materials essential to supply the needs of her industrial machinery and by the acquisition of new foreign markets for Japanese products. Competition for scarce raw materials between Japanese and United States industrialists as well as competition for markets has produced more than one head-on collision between the two countries. The headaches for United States and Japanese officials resulting from collisions of this nature were intensified by disputes over alleged flooding of United States markets with Japanese imports. These disputes were particularly heated regarding the import of Japanese textiles.[8] Economic friction between the two nations reached a peak in 1971 and 1972, with the advent of the so-called "New Economic Policy" of the United States[9] and the imposition of a surcharge on foreign imports by the Nixon administration in August, 1971. This "Nixon shock" produced immediate and bitter reaction on the part of the unforewarned Japanese and unleashed a storm of criticism which was countered by United States officials and businessmen with equally bitter and hostile renunciation and denial.[10] During 1973 and 1974 efforts by both governments to

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[8]See Gary R. Saxonhouse, "A Review of Recent U.S.-Japan Economic Relations," Asian Survey 12 (September 1972): 726-752.

[9]Koji Taira, "Power and Trade in U.S.-Japanese Relations," in Asian Survey 12 (November 1972): 980-988.

[10]Ibid., p. 986.

deal with at least the most blatant sources of economic tension between the two countries led to an easing of the strain in their relationship,[11] and the visit by President Ford to Japan in 1974--the first visit of a United States President to Japan--was hailed as symbolizing a marked improvement in United States - Japanese relations.[12] Many observers note, however, that although the overt manifestations of conflict have been muted, the sources of conflict remain: as the struggle among industrial nations for dwindling natural resources and for expanded international markets intensifies, the re-emergence of confrontation is a distinct possibility.

2) Gradual changes in Japanese domestic politics.

Since the end of World War II, one party--the Liberal Democratic Party (LDP)--has dominated the Japanese domestic political scene. Unceasingly influenced and frequently torn by factional differences and politics, condemned for its close financial ties with Japan's business community, and criticized for the alleged superannuated nature of its leadership, the LDP has nonetheless retained control of the political reins of power for two decades. The perpetuation of LDP political control has been promoted in part by the on-going disunity characterizing Japan's opposition parties--which include the Democratic Socialist Party (DSP), Komeitō, the Japan Socialist Party (JSP), and the Japan Communist Party (JCP)--and the inability of these parties to form an effective cooperative

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[11] Rey Maeno, passim.

[12] Chalmers Johnson, "Japan: The Year of 'Money-Power' Politics," Asian Survey 15 (January 1975): 25-34.

alliance. Many observers claim, however, that the future dominance of the LDP is questionable, at best; recent Japanese elections have produced a gradual but discernable decline in voter support of the LDP, and the resignation of Tanaka as Prime Minister in November, 1974, following disclosures of illicit financial dealings, touched off a power struggle within the LDP among faction leaders for party control. Selection of Miki Takeo to succeed Tanaka represents a significant effort by LDP leaders to resolve internal disputes and strengthen the position and appeal of the party vis-a-vis the electorate. As Johnson noted, however, "Whether the LDP can regain a measure of popular support, heal its internal factional and generational fissures, and offer new leadership to the nation were real questions as the year ended."[13] While the emergence of a strong left wing government does not appear imminent, a shift of Japanese leadership away from LDP conservatism toward a more central policy orientation could produce at least some corresponding change in the on-going LDP policy of support for and alliance with the United States.

3) East-West detente and the trend toward multipolarity.

The relatively recent warming trend in United States-Soviet Union relations, the termination of United States involvement in Vietnam, the re-incorporation of the People's Republic of China into the international community, and the increasing conflict between the industrial nations and resource-rich third world countries, epitomized in the 1973 Oil Embargo, have all been focal points of

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[13] Ibid., p. 32.

intensifying discussion in Japan and have serious implications for United States-Japanese relations.

A number of factors--including Soviet condemnation of Japan as a "puppet of United States imperialism," the long delay which preceded conclusion of a peace treaty between Japan and the Soviet Union following World War II, and on-going disputes regarding fishing rights in the North Sea and possession of four nothern islands, Habomai, Shikotan, Etorofu and Kunashiri, under the prewar control of the Japanese and now held by the Soviets--have combined to render postwar relations between Japan and the Soviet Union only marginally coridal. In conjunction with East-West detente, however, has come a slight warming trend in the interaction between these states, a trend which has been reinforced by Japanese interest in and Soviet desire for Japanese capital and technical assistance the economic development of Siberia.

A similar warming trend has prevailed in Japan's relations with the People's Republic of China. Despite the historical ties which have linked these two countries, Japan was for years a faithful adherent to the United States postwar policy of support for Taiwan and international exclusion of mainland China. The abrupt reversal of this policy by the Nixon administration and the announcement of President Nixon's impending journey to the mainland in early 1971 left an unconsulted Japan astounded and indignant. Despite its embarassment and outrage at the failure of the Nixon administration to confer or inform it of this dramatic policy change, the Japanese government wasted little time in re-establishing diplomatic ties with the People's Republic, and by 1974, improved and expanding ties

of trade prevailed as well as agreements regarding air transport and shipping.

The re-establishment of diplomatic and economic ties between Japan and the People's Republic has been facilitated to some degree by the withdrawal of United States forces from Vietnam and the corresponding elimination of Chinese criticism of Japanese verbal support for United State involvement in Southeast Asia. Troubled by the disturbing image of Caucasians killing Orientals, Japanese support for the United States position in Vietnam was principally a formality necessitated by the nature of the United States-Japanese alliance; nonetheless, this policy of token support for United States involvement in Vietnam proved to be a sore point in Japan's relations with her Asian neighbors. Withdrawal of United States forces from Vietnam coupled with the articulation of the "Nixon Doctrine" and the expressed determination of the United States to reduce its intervention in Asia has raised the question of leadership in Asia and has touched off innumerable discussions among the Japanese regarding their regional role and responsibilities. Assumption of a leadership role in Asia by the Japanese appears problematic, however. On the one hand, the extent of Japanese control and dominance in the economies of a number of Southeast Asian nations has given rise to a feeling that Japan <u>ought</u> to provide some form of political leadership in this region. On the other hand, residual hostility resulting from the Japanese conquest of these nations in World War II combined with increasing charges of Japanese economic imperialism and aggression reinforce Japanese reluctance to jeopardize their present economic investment in this area by

taking any firm political action.

4) Continuing ambiguity in Japanese defense policy.

While Japan has achieved eminence as the third largest economic power in the world, there has been no corresponding attempt to achieve prominence as a dominant military power. The success of Japanese endeavors in the economic realm however, has prompted increasing numbers of Japanese and foreigners to wonder aloud how long this economic elephant can remain a political and military mouse. Will the Japanese be content to remain in the shadow of the American nuclear umbrella and continue to pursue their careful policy of separation of economics and politics, or will events--perhaps reduced faith in the United States defense commitment resulting from the United States withdrawal from Vietnam, or increased economic friction between the two nations, or perhaps a resurgence of militarism and nationalism in Japan--conspire to weaken Japanese reliance on the United States for their national security and lead to a purposeful effort to develop Japan's military potential, including even the acquisition of nuclear weapons? While the ultimate resolution of the issue of Japanese national security--whether to engage in increased autonomous military expansion and development, whether to seek a path of distinct neutrality, or whether to continue to rely upon the United States--is unclear, the considerations and alternatives surrounding this issue are receiving increasing attention in Japan, particularly as the debate regarding the ratification of the Non-Proliferation Treaty intensifies.

The considerations outlined above are among some of the most dominant concerns fueling an on-going debate in Japan regarding the perpetuation and nature of the United States-Japanese alliance and the future role of Japan in the international system. In addition to providing impetus for controversial discussions concerning Japanese domestic and foreign policies, these considerations combine to define in part the context or environment within which specific Japanese organizations engage in the pursuit of nuclear development in Japan; to a significant degree the course of this pursuit and organizational involvement with nuclear development reflect awareness of these considerations.

The early years of Japan's postwar involvement with nuclear development were characterized initially by Japanese awareness of constraints imposed by Allied Occupation policies and by a concern to promote the recovery of the Japanese economy. Under the Occupation all Japanese research begun in prewar days regarding nuclear fission and nuclear physics was prohibited; thus, it was not until 1951, when the outbreak of the Korean War had turned the attention of SCAP forces elsewhere and the formal end of the Occupation seemed to be in sight,[14] that indications of a tentative subtle resurgence of interest of the part of Japanese scientists regarding atomic energy research became marginally apparent. Among the most salient motivations behind this resurgence of

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[14]The Treaty of San Francisco was signed on September 8, 1951: official restoration of Japanese sovereignty came on April 28, 1952, the day the Peace Treaty went into effect.

scientific interest in atomic energy were economic considerations. The belief was growing in scientific, industrial and political circles alike that the future of postwar Japanese economic development was dependent upon both the provision of secure stable sources of competitively priced energy and the ability of Japanese technology to become and remain internationally competitive.[15] Consequently the development of nuclear energy was seen as one way to compensate partially for the lack of natural resources in Japan, to reduce Japanese dependence on foreign energy sources and to accelerate the development of domestic research and technology.[16]

In December, 1955, following several years of discussion and debate among scientists, industrialists, bureaucrats and politicians, the Japanese Diet enacted the legislation which established both the legal basis for Japan's postwar involvement with nuclear development and the institutional structure necessary to provide government sponsorship and control of this development. Of the various laws adopted at that time the most significant is the Atomic Energy Basic Law. The objectives of the Atomic Energy Basic Law, according to Article I, are "to secure energy resources in the future," "to achieve the progress of science and technology," and to promote atomic industry in order to contribute "to the welfare

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[15]See, for example, "Bright Aspect of Atomic Energy Competition," Sangyo Keizai, Daily Summary of the Japanese Press (DSJP), July 2, 1954, p. 15.

[16]Victor Gilinsky and Paul Langer, The Japanese Civilian Nuclear Program (California, The Rand Corporation, August 1967), passim.

of mankind and to the elevation of the national living standard."[17] The Basic Law establishes a fundamental principle regarding Japan's nuclear development, namely, that all work in this realm shall be limited to peaceful purposes. The Law also provides for freedom of research on the basis of democratic principles and requires that the result of all research shall be made public.[18]

The institutional structure created in 1955 and 1956 to monitor Japanese nuclear development included the Atomic Energy Commission (JAEC), established in the Office of the Prime Minister as an advisory organ to the Prime Minister, and the Science and Technology Agency (STA), intended "to coordinate the activities of the ministries concerned with the development of science and technology."[19] The STA was established as an "Outer Agency" linked to the Office of the Prime Minister and serves as the Secretariat of the JAEC; the Minister of the STA generally serves concurrently as the Chairman of the JAEC. Table 12 shows the organizational position of the STA. While the JAEC is the body "from which emanate the basic nuclear policies and long-range plans for Japan's nuclear development," the STA retains overall administrative responsibility for Japan's nuclear policies.[20] Although minor changes have occurred

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[17]Rodney L. Huff, "Political Decision-Making in the Japanese Civilian Atomic Energy Program" (Ph.D. dissertation, The George Washington University, 1973), p. 38.

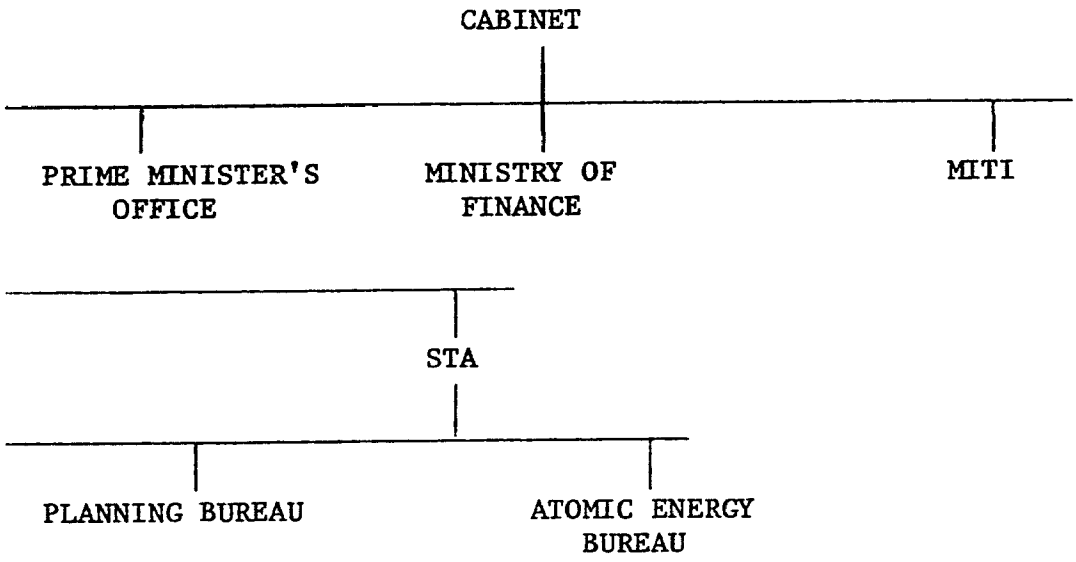
[18]The Japan Annual, 1958 (Tokyo, Japan Annual Publications, 1958), p. 219.

[19]Kawashima Yoshio, "Organization of Science and Technology in Japan," Nature 254 (October 5, 1973): 241.

[20]Gilinsky and Langer, p. 10.

TABLE 12

ORGANIZATIONAL POSITION OF THE SCIENCE AND TECHNOLOGY AGENCY



Source: Victor Gilinsky and Paul Langer, The Japanese Civilian Nuclear Program (California, The Rand Corporation, August, 1967), p. 11.

over the years, the Atomic Energy Basic Law and the administrative organization of Japan's nuclear program, centering primarily on the JAEC and the STA, have remained largely unchanged since 1956.

By the time the Japanese Diet enacted the legislation necessary to establish a legal basis for Japanese postwar involvement with nuclear development, many of the basic strategies which would underlie this involvement had already been established. Among these strategies the most notable include: 1) close and consistent interaction and consultation among government, industrial and academic representatives; 2) assumption of responsibility by the Japanese government for sponsoring and financing high-risk and costly nuclear research projects, and; 3) dependence upon and importation of foreign technology whenever possible, together with emphasis in domestic research programs on undeveloped areas of nuclear technology. This strategy was designed to maximize the benefit of foreign discoveries while advancing the frontiers of nuclear knowledge through domestic research and development; the ultimate goal of this strategy was to achieve autonomy and leadership in the realm of nuclear energy in the coming decades. As students of Japanese history are aware, these strategies have their origins in the strategies developed during the Meiji era to facilitate Japan's drive for modernization and industrial equality with the West. Most of the developments in the nuclear realm which have transpired in Japan since the establishment of the JAEC and the STA have reflected the on-going impact of these basic strategies; moreover, these strategies in turn reflect the underlying realities of domestic and international circumstances impinging on the

Japanese pursuit of nuclear development.

From the earliest days of Japan's postwar involvement with nuclear energy, the committees and groups which have met to discuss nuclear policy have been composed of representatives from government ministries, industrial complexes and universities.[21] Membership in these groups has been relatively consistent, reflecting in part the stability of the Japanese domestic political scene and the on-going ties between government and industry which characterize many issue-areas in Japan. The extent to which the Japanese government supports projects such as the development of an experiemental Fast Breeder Reactor (FBR), which frees industrial firms from the high cost and capital risk involved, is only one indication of the cooperative nature of these ties. In implicit acknowledgment of both the legal constraints imposed on military armament by Article IX of the postwar Constitution and the ambivalent nature of Japanese defense policy, those involved with nuclear development in Japan make repeated efforts to emphasize the peaceful intentions underlying their involvement. Throughout the course of their postwar experience with atomic energy, however, the Japanese have consistently pursued a quest for autonomy in the nuclear realm, lest their peaceful declarations one day prove insufficient to free them from foreign use of nuclear technology and nuclear fuel as political weapons. Thus goals related to the pursuit of nuclear development include

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[21] See, for example, "Four Branches Set Up to Build Atomic Pile," Tokyo Shimbun, DSJP, July 15, 1954, p. 12, and; "Focal Point of Atomic Energy Issue," Sangyo Keizai, DSJP, May 2, 1955, p. 2, and; "Business Leaders on Industrial Use of Atomic Energy," Yomiuri, DSJP, February 10, 1955, pp. 9-10.

ultimate elimination of reliance on foreign research findings and technology, procurement of reliable sources of natural uranium, needed to compensate for the limited quantities of this resource located in Japan and to guarantee Japan's nuclear industry an adequate supply of nuclear fuel, and promotion of efforts to develop domestic facilities covering every stage of the nuclear fuel cycle, notably enrichment. Awareness of the vulnerability of the Japanese islands to any political use of economic resources, particularly in regard to energy resources--indisputably demonstrated by the 1973 Oil Crisis--has increasingly underscored the need to pursue these goals and ultimately to minimize Japanese dependence on both Mideast oil and enriched uranium from the United States. The salience of these considerations and the consistency with which they have been a part of nuclear development in postwar Japan is reflected in the Long-Range Programmes for nuclear development published by the JAEC in 1961, 1967 and 1972.[22]

PART TWO

Japanese Organizations and International Safeguards

Part One provides a cursory examination of the environmental constraints impinging upon organizational involvement with nuclear

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[22]See Japan Atomic Energy Commission, "Needs to Nuclear Power Generation and the Related Programme in Japan," Proceedings of the Third International Conference on the Peaceful Uses of Atomic Energy, 31 August - 9 September, 1964 (New York, United Nations, 1965), pp. 98-99, and; Gilinsky and Langer, pp. 1-3, 38, and; Japan Atomic Energy Commission, General Review of the Long Term Program of the Development and the Utilization of Atomic Energy (Tokyo, JAEA, June 1, 1972).

development in Japan. In Part Two we shall focus on the subset of Japanese organizations involved with nuclear energy that are also involved with international safeguards. After identifying these organizations, we shall attempt to specify some of the characteristics associated with the structure, decision-making techniques and personnel of these organizations which could affect the nature of their involvement with IAEA safeguards.

The course of Japanese nuclear development is closely linked with the evolution of international safeguards policy and to a significant degree, Japan and the International Atomic Energy Agency have assumed the bulk of the burden of developing a system of acceptable international safeguards. That is not to say that the two have necessarily cooperated in this endeavor, although this has frequently been the case: rather, it is to say that Japan has served as the principle testing ground--or guinea pig, as some Japanese have noted ruefully--for IAEA efforts to implement and refine an international safeguards system. The experience of the Agency with safeguards began as a result of action taken by the Japanese, for, as has been previously noted, the request filed by the Japanese government with the infant IAEA in September, 1958, for the Agency to supply three tons of natural uranium for Japan's first domestically built research reactor was the primary motivation behind the decision of the Agency's Board of Governors to undertake the delineation of the Agency's first safeguards policy.[23]

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[23]"A Year of Expansion," IAEA Bulletin 1, no. 3 (October 1959): 6.

The safeguards applied by the Agency to Japan in conjunction with the transfer of the three tons of natural uranium were project safeguards--that is, regulatory measures resulting from the conclusion of an agreement between the Agency and a member-state for the provision of nuclear matter by the Agency to the state. On September 23, 1963, Japan was instrumental in involving the Agency in safeguards resulting from another type of agreement, for on that day,

> the first agreement transferring to the Agency the administration of the safeguards under a bilateral agreement was signed at IAEA headquarters by Ambassador H. Uchida, for Japan, Professor Henry D. Smyth, Governor to IAEA from the United States, on behalf of his Government, and Director General Sigvard Eklund for IAEA.
>
> On that occasion, Dr. Eklund stated:
>
> "The past year has seen several important developments in the Agency's safeguards programme... As regards experience, none is more valuable than practice, and any first step in this field assumes therefore special significance and deserves particular recognition.
>
> Seen in this context, Japan has made a unique contribution to the work of the Agency. As you may recall, Japan was the first country to receive nuclear fuel through the Agency, and to which Agency safeguards were attached.
>
> . . . today we are witnessing the formal conclusion of the first transfer to the Agency of responsibility for safeguards under a bilateral agreement. This is the culmination of negotiations started in 1961, following the announcement by Japan and the United States of their intentions in this regard . . ."[24]

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[24]"Breakthrough for International Safeguards," IAEA Bulletin 6, no. 1 (January 1964): 13.

Thus, very early in the history of Japan's postwar nuclear development, the organizations and people involved with this development came into contact with the concept of international safeguards, and were instrumental in shaping the nature of the IAEA's initial experiences with international safeguards policy. The nature of the interaction which has transpired between the Agency and the Japanese regarding international safeguards since these initial contacts and the effects of this interaction on IAEA efforts to develop international safeguards will be explored in detail in Chapter IV. Before we focus on this interaction, however, it is necessary to look more closely at the national organizational context into which international safeguards were originally introduced and attempt to discern its present parameters.

Attempting to unravel the whole of the organizational fabric involved with safeguards in Japan is somewhat akin to untangling the proverbial spider's web. The strands are many, and their relationship is not always clear. Thus it may be useful to adopt a dual approach to the depiction of the organizational structure underlying Japan's experience with safeguards; we will first identify the Japanese organizations formally involved with IAEA safeguards, and then focus on some of the structural characteristics of this group of organizations which could affect their involvement with safeguards.

Formally, the organizations which represent the means whereby the Japanese have become involved with safeguards can be grouped into four general categories: government, industry, academics and mass media.

Organizational Structure: Government

Officially, at the heart of the government organizations involved with nuclear policy, including safeguards, is the Japan Atomic Energy Commission. The Commission is officially described as "the supreme organ to map (out) Japan's atomic energy development programme . . ."[25] and official policies such as the 1961, 1967 and 1972 Long-Range Programmes are formally issued by the JAEC. The seven-member JAEC is officially headed by the Minister of the Science and Technology Agency, and the remaining six members[26] who are officially "above politics" are appointed by the Prime Minister. According to the Atomic Energy Basic Law of 1955, the Prime Minister must "respect" the decisions of the Commission.[27]

Despite its position as titular head of the governmental organizations involved with nuclear energy in Japan, the real power of the JAEC appears variable. Several of the Japanese officials interviewed for this study stressed the advisory nature of the Commission noting that legally it is an advisory body only. Pains were also taken to stress the contrast of the JAEC and the now dissolved United States Atomic Energy Commission which had both regulatory and promotional functions. One official noted that attempts by the Diet in 1955 to establish the JAEC as an independent

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[25]"Atomic Energy Development," Facts About Japan (Tokyo, Ministry of Foreign Affairs March 1964), p. 1.

[26]The number of members of the JAEC may vary between five and seven; one-half of the Commission serves half time while the other half serves full time. The JAEC has a supporting staff or five to ten members.

[27]Gilinsky and Langer, p. 10.

executive committee met with strong resistence from the Cabinet which opposed the establishment of a potentially powerful independent power base: nevertheless, in practice, according to this official, the Commission functions today much like an executive committee.

According to Matsui Akira, a former diplomat and specialist in international affairs, who was appointed on March 11, 1970 to serve a four-year term as a Commissioner of the JAEC, the Commission has played very little role in the development of Japan's safeguards policy. Matsui noted that while the Commission is in close communication with those formulating safeguards policy, it does not play an active part in this process. In formal legal terms, however, the Commission has the right to have the final word regarding the contents of this policy.

In contrast to the rather distant, formal role performed by the JAEC regarding safeguards is the activist role assumed by the Science and Technology Agency. An "External Organ" of the Prime Minister's Office, the STA was established to serve as "an administrative organ responsible for overall coordination of government efforts"[28] in the scientific realm. The major developments relating to the growth of the Agency are listed in Table 13. Table 14 shows the structure of the Agency as of July 1, 1973: 2,095 people were permanent employees of the Agency as of the end of the fiscal year 1973.[29]

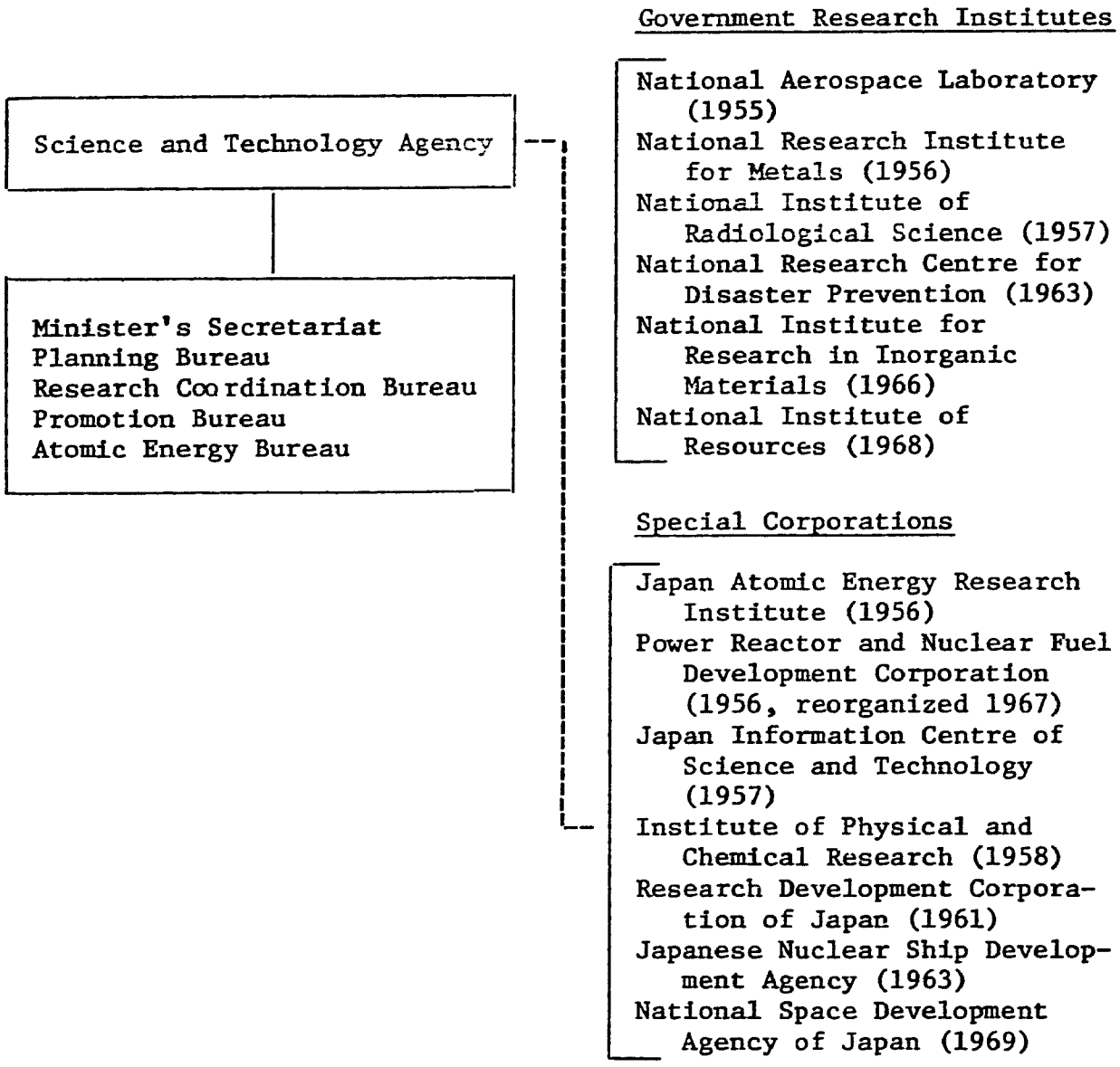
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[28] Science and Technology Agency: An Outline (Tokyo, Prime Minister's Office, 1973), p. 3.

[29] Ibid., p. 17.

TABLE 13

RESPONSIBILITIES OF THE SCIENCE AND TECHNOLOGY AGENCY



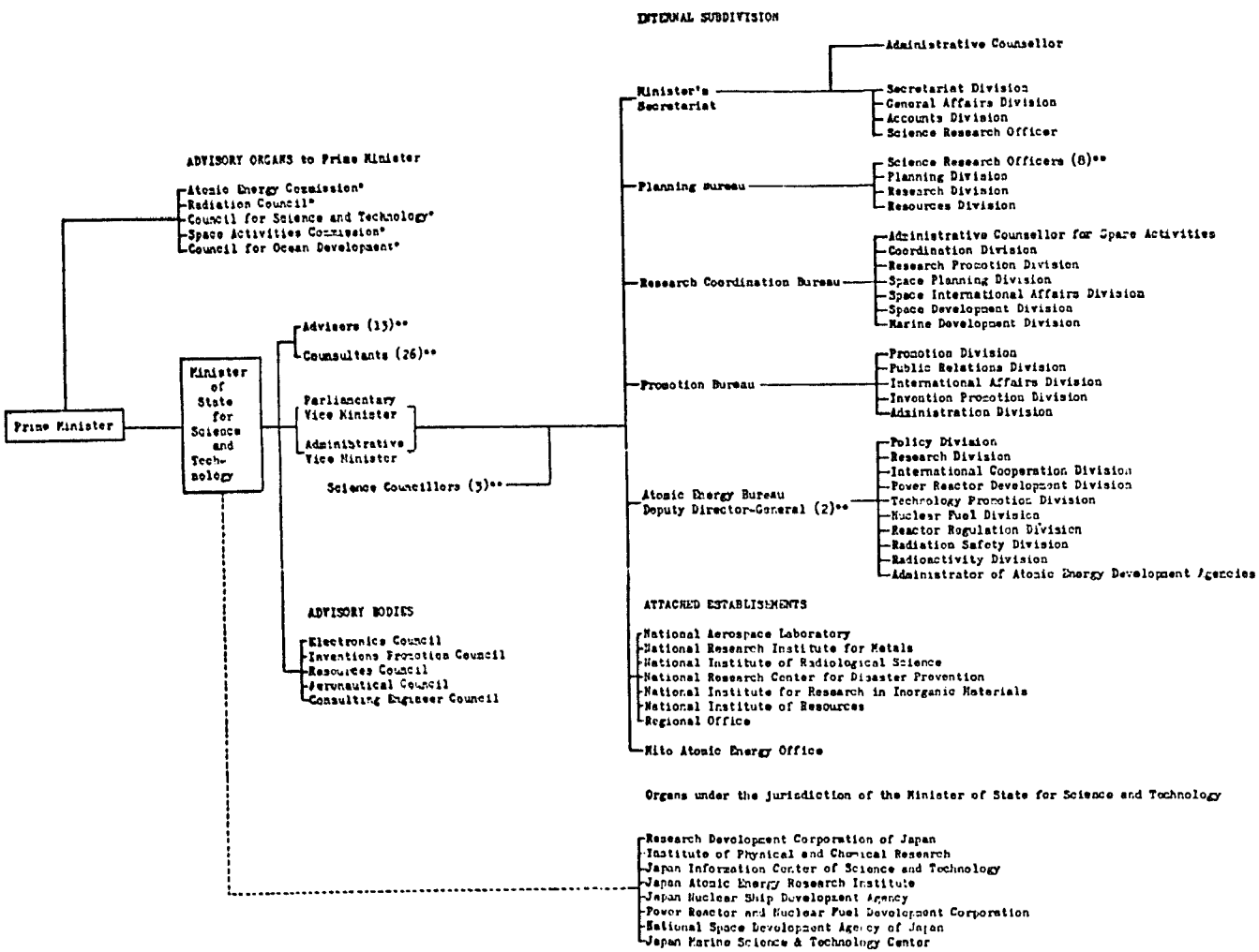
(Year of establishment is shown in parentheses.)

Source: Kawashima Yoshio, "Organization of Science and Technology in Japan," Nature 245 (October 5, 1973): 241.

TABLE 14

Annex 1 ORGANIZATION CHART OF SCIENCE AND TECHNOLOGY AGENCY

(1st July, 1973)



* STA serves as an official Secretariat to these advisory organs.

** Numbers in parenthesis indicate number of persons assigned to the post.

Source:
Prime Minister's Office, Science and Technology Agency: An Outline, Tokyo, Prime Minister's Office, 1973.

As Table 14 reveals, the STA is divided into five bureaus, including the Atomic Energy Bureau (AEB). The AEB had, until recently, ten divisions including the International Cooperation Division which housed the Safeguards Office, established in March, 1970, with a staff of five to six.[30] The AEB and the Safeguards Office have handled the bulk of the activity in Japan relating to international safeguards. For example, the AEB has provided notification of the movement or shipment of nuclear material to the IAEA, published monthly statements regarding IAEA inspections in Japan, and administered the research conducted by special government corporations such as the Japan Atomic Energy Research Institute (JAERI) and Power Reactor and Nuclear Fuel Development Corporation (PNC) regarding the technical aspects of safeguards.

In January, 1974, it was expected that in July the AEB would be reorganized, and divided into two main sections, a Safety Department and a Promotion Department. The Safety Department would be subdivided into five divisions including: an Atomic Energy Safety Division, a Reactor Regulations Division, a Reactor Safety Examination Office, a Radiation Safety Division and a Nuclear Fuel Regulations Division (with a proposed staff of nineteen). A safeguards office with a proposed staff of thirteen would be assigned to this Division. This expanded safeguards office and the AEB as a whole would retain their safeguard responsibilities and function

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[30] At the time when Japan became involved with safeguards, safeguard matters were regarded as considerations imposed from the outside--first by the United States and then by others. Consequently the Safeguards Office of the AEB was attached to the International Cooperation Division.

as the focal point of much of the government's activity relating to safeguards.[31]

In addition to the JAEC and the STA, two government ministries--the Ministry of Foreign Affairs (Gaimushō) and the Ministry of International Trade and Industry (MITI)--have had some involvement with the delineation of Japan's safeguards policy. The Science Division of the United Nations Bureau of the Ministry of Foreign Affairs (approximately fifteen staff members) has handled the bulk of Japan's negotiations with the IAEA regarding safeguards, while the Technical Promotion Division has served as the distribution point for research grants regarding safeguards to private industry. MITI comes in contact with international safeguards as a result of its role as regulator and overseer of Japan's nine major electric power companies. Moreover, it should be noted that final authority to authorize or reject budgetary funding requests and the power to control the expansion of government organizations and the establishment of new organizations lies with the Ministry of Finance and the Administrative Control Agency respectively. The activities of these various government organizations regarding safeguards will be examined in Chapter IV.

In addition to the government agencies and ministries identified above, mention should be made of several semi-governmental and government-supported organizations which have come in contact with international safeguards. Of the semi-governmental organizations

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[31]"STA Reorganization," (Unofficial translation, Tokyo, United States Embassy, September 10, 1973).

involved, the Japan Atomic Energy Research Institute (JAERI) and the Power Reactor and Nuclear Fuel Development Corporation (PNC) are the most salient. Both of these organizations are special corporations set up by special law to engage in government-approved research. Both are fully funded by the government and both are under the administrative control of the Science and Technology Agency (see Table 14). Moreover, both have engaged in research and development projects regarding safeguards. JAERI, established in 1956, has been involved primarily in basic research regarding the technical aspects of safeguards policy, and has had limited experience with safeguards implementation. PNC, on the other hand, has been deeply involved with both the developmental and the applied aspects of safeguards policy. Established in October, 1967, to replace the former Atomic Fuel Corporation, PNC represents a primary vehicle whereby the Japanese government is seeking to promote the autonomous development of Japan's nuclear industry.

> The nuclear generating capacity of Japan is expected to attain 60 million KW in 1985.
>
> In order to realize this target, the main efforts have been directed toward conventional reactors through the acquisition and assimilation of their manufacture in the country.
>
> The time has come however for Japan to develop its own design of advanced power reactors, to meet the necessity of diversifying the sources of nuclear energy and of better utilizing the source materials, as well as to assure the stable supply of inexpensive energy, and to make Japan independent in the technology related to energy generation.
>
> These circumstances have led to the affirmation of the government's determination to develop a fast breeder reactor and a heavy water reactor; and at the same time to establish a nuclear fuel cycle adapted to domestic requirements. It is to undertake the realization of these plans that PNC was established . . .

> The basic policy on power reactor development established by the Prime Minister sets forth the following points:
>
> The development of appropriate types of nuclear reactor with the view to assuring the stable supply and effective utilization of nuclear fuel and to bringing out the advantages of nuclear power generation to their fullest extent is a vital problem in national policy for energy supply. At the same time, this program should contribute greatly to strengthening the industrial potential of the country and to raising its level of science and technology.
>
> The time-table drawn up to realize (the) above aims provides for the development of a commercial advanced thermal reactor in the second half of the 1970's and similarly of a fast breeder reactor in the mid 1980's. The construction and operation of prototype reactors must be carried out to accord with this timetable, and this is being undertaken by the Power Reactor and Nuclear Fuel Development Corporation, with the collaboration of government, and academic and industrial groups.[32]

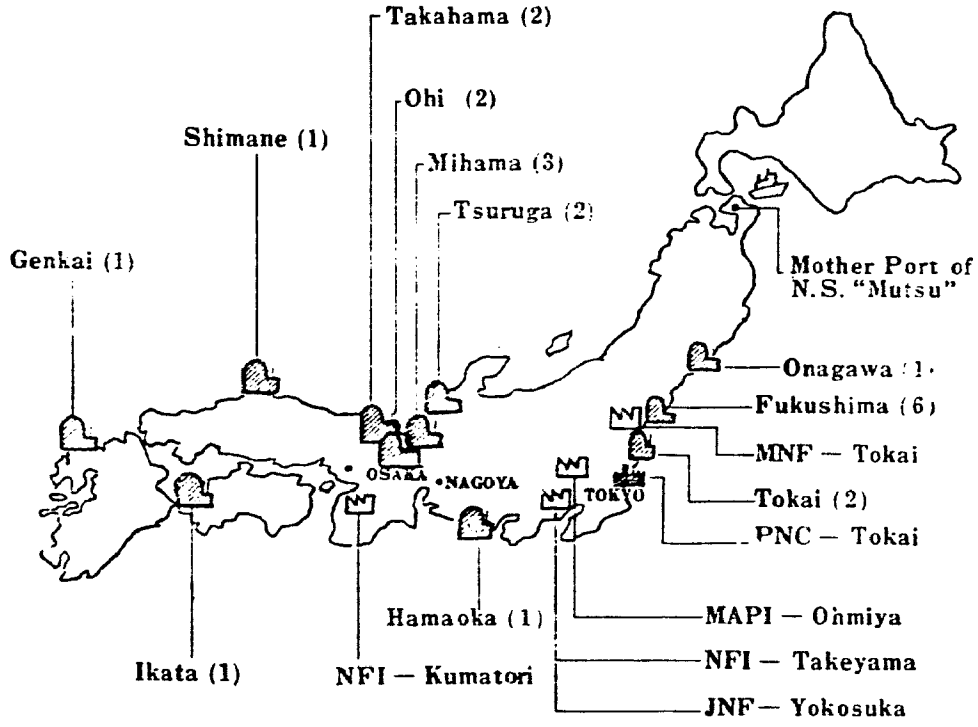
While the head office of PNC is located in Tokyo, the bulk of the technical work of the organization is carried on in facilities at O-arai Engineering Center and at Tokai-Mura (See map, p. 165). Approximately five hundred and fifty engineers and technicians are employed at Tokai-Mura by the Corporation to staff its four technical divisions, which include: 1) plutonium fuel development; 2) uranium enrichment; 3) fuel reprocessing, and; 4) technical services.[33] The Corporation employs a total of approximately twelve hundred people. The budget for the Corporation in Fiscal Year 1972 was approximately $126 million, and in Fiscal Year 1973 was $141 million. Ninety-one per cent of this funding comes from

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[32] Power Reactor and Nuclear Fuel Development Corporation (Tokyo, Power Reactor and Nuclear Fuel Development Corporation, n. d.), p. 2, 4.

[33] Higuchi Katsuji, "Activities of Tokai Works," Tokai-Mura, Japan, 1974.

Location of Nuclear Facilities



Nuclear Power Station (No. of units)

Fabrication Facility

Pu. Fabrication Facility & Reprocessing Plant

Source: Nuclear Materials Control Center, "Nuclear Materials Control Center," Tokyo, Nuclear Materials Control Center, 1973.

the government: nine per cent is supplied by private industry. Both government and private industry supply the funds for the various facilities being constructed by PNC which include an $80 million reprocessing plant, as well as the experimental fast reactor, "JOYO," the prototype fast breeder reactor, "MONJU," and the prototype advanced thermal reactor, "FUGEN."[34]

To date, PNC's experience with international safeguards has primarily involved research regarding safeguards techniques, and IAEA inspections of small plutonium laboratories. These inspections are conducted in accord with the trilateral agreements currently in effect between the United States, Japan and the IAEA, and Great

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[34]The Advanced Thermal Reactor (ATR), which consumes a smaller amount of enriched uranium than does a Light Water Reactor (LWR), is regarded as one means of reducing Japan's dependence on imported enriched uranium. A heavy water-moderated, light water-cooled ATR (FUGEN) is scheduled for completion in 1975. An experimental Fast Reactor (JOYO), a sodium-cooled 50 MW(e) reactor now being developed is also scheduled to go critical in 1975. A prototype Fast Breeder Reactor (FBR) is scheduled for completion in 1978. The FBR, which creates more fuel (plutonium) than it consumes, is regarded by the Japanese as a key means of minimizing their dependence on foreign supplies of enriched uranium.

"JOYO" means Eternal Light in Japanese, and is also a name of the area including the site of this Experimental Fast Reactor, where spiritual learning flourished. "Monju" Bodhisattva is the left hand attendant of Sakyamuni Buddha symbolizing the attribute of wisdom and is depicted riding upon a lion. "Fugen" Bodhisattva is the right hand attendant of Buddha symbolizing the attribute of compassion. He rides upon a six tusked elephant. Both the lion and the elephant have great power but still this power remains controlled by the wisdom and the compassion that Monju and Fugen Bodhisattva symbolize. Contemporary man has been overwhelmed by the magnificent achievements of natural science and technology while he has been apt to overlook spiritual learning. With our strong hope and desire to harmonize spirituality and science, we have thus designated the Prototype Fast Breeder Reactor as MONJU and the Prototype Advanced Thermal Reactor as FUGEN.

From Power Reactor and Nuclear Fuel Development Corporation p. 24.

Britain, Japan and the IAEA, for the United States and Great Britain are the primary suppliers of the nuclear material used in these laboratories. It is expected, however, that contact between PNC and the IAEA could increase significantly in the future once the various facilities under construction by PNC go critical. This expectation will indeed be realized if and when Japan becomes a party to the Non-Proliferation Treaty. Japan's relation to this Treaty and its implications for Japanese nuclear development will be examined in Chapter IV.

In addition to JAERI and PNC, a third semi-governmental organization, the Japan Nuclear Ship Development Agency (see Tables 13 and 14) has had contact with international safeguards: this contact has been minimal, however, and this organization has not played a significant role in shaping the Japanese position vis-a-vis safeguards.

Mention should also be made of the Electric Power Development Corporation (EPDC) which was set up by the government to develop hydroelectric resources in areas where a high risk is involved. In this sense EPDC is similar to the Japan Atomic Power Company (JAPCO), a privately owned high-risk corporation which is described below. Both EPDC and JAPCO are working to develop new reactor types and in this sense they represent competitive organizations, although they are operating in different areas of reactor development. EPDC involvement with safeguards is minimal and results from its interest in the operations of JAPCO.

Finally, mention should be made of an organization sanctioned by but not officially controlled by the Japanese government. On

April 15, 1972, the Nuclear Materials Control Center (NMCC) was established with approval from STA and MITI as a non-profit organization to facilitate "sound development of the atomic industry by improving control over nuclear materials and promoting international cooperation."[35] Although supported by government ministries, the NMCC is not formally considered a government organization; rather, it serves as an "independent" organization linking both government and industry interests. At the time of its establishment, the Center was expected to serve as the forerunner of a national safeguards office, and represented a significant effort by the Japanese to promote the development of a national system of safeguards.

> Establishment of the Center is one of the means to improve the domestic set up for simplified, reasonable safeguards. Specifically, the Center will 1) help, or act for, the Government in keeping records and making reports, 2) act for enterprises in taking and analyzing samples and in receiving (IAEA) inspections, 3) promote technical development and international cooperation, and 4) make the people concerned familiar with the related laws and regulations.[36]

By the end of 1973, the Center was monitoring the flow of nuclear material through fifty two of the one hundred and five nuclear facilities in Japan; these fifty two facilities controlled ninety five percent of the nuclear material in Japan. Chapter IV will include a closer look at both the activities of the Center and

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[35]"'Nuclear Materials Control Center' to be Inaugurated in April," JAIF Weekly, March 30, 1972, Atomic Energy Commission, American Embassy, Tokyo (AEC AM-EMB) unofficial translation, April 10, 1972.

[36]Ibid.

the strategy which led to its establishment.

Organizational Structure: Industry and Utilities

A large number of industrial companies in Japan have at least peripheral interest in the realm of atomic energy; the Japan Atomic Industrial Forum (JAIF) which was established on March 1, 1956 to serve as the spokesman for the nuclear industry in Japan[37] listed over 700 firms as members in 1974. Clearly, however, not all of these companies are involved with safeguards policy, for

> "the bulk of nuclear industrial activities is carried on by 11 Japanese industrial firms which are tied financially into five groups, and account for about 90 percent of Japanese industrial research and development in nuclear applications. [38]

The five groups include: 1) Nippon Atomic Industry Group (NAIG); 2) Tokyo Atomic Industry Group (TAIG); 3) Mitsubishi Atomic Power Industries Group (MAPI); 4) First Atomic Power Industry Group (FAPIG), and; 5) Sumitomo Atomic Energy Industries Group (SAEI).[39] Generally speaking, it is one of the subunits of these groups that is in contact with international safeguards.

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[37] In December, 1973, the JAIF was reorganized in an attempt to make it an impartial, neutral organization wherein divergent groups could express their views, both pro and con, about the development of nuclear energy in Japan. This move toward reorganization was greeted with criticism and skepticism by a number of observers who questioned both the wisdom and feasibility of this undertaking; one U.S. official observed that he would be curious to see how long the nuclear industry would fund a forum which invited the opponents of nuclear development to freely (verbally and financially) propound their views.

[38] "Japan: Atomic Energy Program," (Tokyo, United States Embassy, February, 1973), p. 6.

[39] See Huff, Chart 4, p. 56.

Corporate interest in nuclear industry implies interest in at least one of the stages in the nuclear fuel cycle: the extent of a corporation's involvement with safeguards is correlated with the stage of the nuclear fuel cycle with which it is involved.

1. Uranium mining, refining and conversion.

Because the amount of natural uranium located in Japan is extremely limited, the Japanese are forced to go abroad to secure the volume of uranium required for their peaceful nuclear efforts. Uranium prospecting has therefore been undertaken by several Japanese companies including PNC in a variety of nations including Canada, Australia and South Africa. Early in the history of its involvement with safeguards, however, it was decided by the IAEA that the application of international safeguards to uranium prospecting and uranium ore is unnecessary: consequently none of the prospecting activities of Japanese companies is affected by safeguards policy.

2. Uranium enrichment.

Of the various stages in the nuclear fuel cycle, the technology associated with the enrichment stage is the most complex and the most costly. Moreover the degree to which uranium is enriched is a key factor in determining its utility for military rather than peaceful purposes. Consequently enrichment technology has been developed predominantly by the Nuclear-Weapon States and research in this realm is classified. While some Non-Nuclear-Weapon States including Japan have undertaken research in this area, Japan nonetheless remains dependent on foreign sources of enriched uranium necessary to fuel its reactors: to date, Japan is virtually one

hundred percent dependent upon the United States for enriched uranium. The degree of Japan's dependency in this area and its vulnerability to the use of enriched uranium as a political weapon are sources of constant concern to the Japanese. However, because enrichment facilities do not yet exist in Japan, Japanese firms are not involved with safeguards at this stage of the nuclear fuel cycle.

3. Conversion and fabrication of the fuel element.

Of the various stages of the nuclear fuel cycle, two, including the fuel fabrication stage, have been identified by experts as particularly vulnerable to illicit diversion of nuclear material. Consequently, those firms which have become involved with conversion and fuel fabrication in Japan in recent years are also becoming increasingly involved with IAEA safeguards. Three blocks of companies--Mitsubishi Nuclear Fuel (MNF), Japan Nuclear Fuel (JNF), and Nuclear Fuel Industry--were licensed by the STA as of January, 1974, to engage in fuel fabrication activities. JNF and MNF are roughly equal in production capacity and are more influential than Nuclear Fuel Industry. Table 15 shows the composition of these blocks; the increasing involvement of these companies with the IAEA will be discussed in Chapter IV.

4. Nuclear power plants.

Of the various Japanese companies involved with nuclear power plants, the nine regionally based electric power companies--Hokkaido, Tohoku, Tokyo, Chubu, Hokuriku, Kansai, Chugoku, Shikoku and Kyushu--are among the most prominant, and of these nine companies, Tokyo Electric, Kansai Electric and Chubu Electric are regarded as the most powerful. This power stems from the fact that

TABLE 15

FUEL FABRICATION COMPANIES

Japan Nuclear Fuel	Jointly owned:	General Electric Toshiba Hitachi
Mitsubishi Nuclear Fuel	Jointly owned:	Westinghouse Mitsubishi Heavy Industries Mitsubishi Metal Company (assumed fuel fabrication functions of Mitsubishi Atomic Power Industries)
Nuclear Fuel Industry	Jointly owned:	Sumitomo Electric Furukawa Electric

while each of the nine companies holds a regional monopoly in its area, the number of people serviced, and therefore the revenue base and potential for direct public impact is greatest for these three firms (Tokyo Electric is the largest utility company in the world).

While technical experts generally concur that diversion of nuclear material from a nuclear reactor would be difficult at best as well as extremely expensive, and therefore reasonably unlikely, most of the IAEA safeguarding efforts in Japan have been in relation to reactors, simply because the Japanese initially and until recently have focused most of their efforts on the construction and operation of reactors. Much of the early work on reactors was undertaken by Tokyo Electric and Kansai Electric; now, however, all of the electric companies have plans to build or are building nuclear reactors (see Table 16). Consequently all of these companies are involved with international safeguards and IAEA plans or attempts to implement safeguards procedures.

According to Japan's electrical industries law, the electric power companies are under the strict control of the government. This control is administered through MITI; thus MITI must approve policy changes such as rate increases, and it is MITI that issues the final approval required for the construction of nuclear power plants. It should be immediately noted, however, that in practice,

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[40]The process of securing a license for the construction of a nuclear power plant is a rather complex one, and generally requires between six months and one year to complete. The electric company involved files a request with MITI which, after studying the request, refers it to the JAEC, for the Commission is the body which must officially issue the licence. The Commission in turn refers the request to a commission which deals with reactor safety; this

TABLE 16

CONSTRUCTION PROGRAM OF NUCLEAR POWER STATIONS

Utility	Unit Number	Output MWe (net)	Construction Starts	Commercial Operation
Hokkaido	N	350	Dec. 1973	Mar. 1980
	O	550	Oct. 1977	Feb. 1983
Tohoku	Onagawa	524	Feb. 1971	Mar. 1977
	Namie	784	Mar. 1968	Sept. 1973
Tokyo	Fukushima 1	460	Dec. 1966	Mar. 1971
	Fukushima 2	784	Mar. 1968	Sept. 1973
	Fukushima 3	784	Mar. 1970	Dec. 1974
	Fukushima 5	784	Dec. 1971	Dec. 1975
	Fukushima 4	784	Mar. 1972	Aug. 1976
	Fukushima 6	1100	Dec. 1971	Oct. 1976
	Fukushima II-1	1100	Aug. 1972	Jan. 1978
	Fukushima II-2	1100	Sept. 1973	Jan. 1979
	N	1100	Dec. 1973	Mar. 1978
	N 1	1100	Nov. 1974	Jul. 1979
	N 2	1100	Nov. 1975	Jul. 1980
	N 3	1100	Dec. 1975	Aug. 1980
	N 4	1100	Nov. 1976	Jul. 1981
Chubu	Hamaoka 1	540	Mar. 1971	Nov. 1974
	Hamaoka 2	840	Mar. 1972	Jun. 1977
	Q	1100	Sept. 1973	Jun. 1978
	R	1100	Jun. 1976	Jun. 1980
	R	1100	Jun. 1977	Jun. 1981
Hokuriku	R	500	Dec. 1973	Dec. 1977
	S	800	Aug. 1977	Aug. 1981
Kansai	Mihama 1	340	Dec. 1966	Nov. 1970
	Mihama 2	500	May. 1968	Jul. 1972
	Takahama 1	826	Dec. 1969	Aug. 1974
	Takahama 2	826	Nov. 1970	Jul. 1975
	Mihama 3	826	Mar. 1972	Aug. 1976
	Oh-ii 1	1175	Jul. 1972	Apr. 1977
	Oh-ii 2	1175	Jul. 1972	Oct. 1977
	N 1	1200	Mar. 1974	Jul. 1979
	N 2	1200	Mar. 1974	Jan. 1980
	N 3	1200	Aug. 1974	Jul. 1980
	N 4	1200	Aug. 1974	Jan. 1981
Chugoku	Shimane	460	Dec. 1970	Nov. 1973
	F	750	Jun. 1975	Jul. 1980
Shikoku	Ikata	566	Mar. 1972	Apr. 1977
	A	566	Mar. 1975	Jul. 1979

TABLE 16

(cont'd)

Utility	Unit Number	Output MWe (net)	Construction Starts	Commercial Operation
Kyushu	Genkai-1	559	Dec. 1970	Jul. 1975
	Genkai-2	559	Dec. 1973	Jul. 1978
	P	826	Jul. 1975	Jul. 1980
J.A.P.C.	Tokai 1	166	Feb. 1960	Jul. 1966
	Tsuruga	357	Mar. 1966	Mar. 1970
	Tokai 2	1100	Jul. 1971	Oct. 1976
TOTAL		45 Units 36,961 MW		

Source: Nuclear Power Development in Japan (Tokyo, The Federation of Electric Power Companies, July, 1973), pp. 8-9.

MITI's role is termed one of guidance, not control, by senior Japanese officials involved with nuclear energy, and that MITI has been criticized by the Japanese press for representing the interests of the electrical industry rather than acting as its watchdog.

In addition to the nine electric power companies, there are several other industrial organizations in Japan that are involved with reactor development, and consequently, international safeguards. The most notable of these companies is a company which has played a dominant role in shaping Japan's policy regarding safeguards, namely, the Japan Atomic Power Company (JAPCO). JAPCO was established in the late 1950s by Japan's nine electric power companies with the cooperation of the Japanese government and the five atomic energy industrial groups as a means of distributing equally the risk involved in constructing a nuclear power plant, for at that time the risk was deemed so great that no one company was willing to undertake the project on its own. Consequently in February, 1960, JAPCO began construction of the first commercial reactor put into operation in Japan, a British gas-cooled reactor (166/MWe) built at Tokai-mura. In July, 1966, the reactor went critical. Since that time JAPCO has undertaken the construction of two other reactors: a BWR (357 MWe) begun at Tsuruga in March, 1966 was completed in

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commission corresponds roughly to the United States Administrative Committee on Reactor Safety. This commission, composed of technical specialists, studies the request and reports its findings and recommendations back to the JAEC. The Commissioners of the JAEC then meet to consider both the technical recommendations and the social implications of the request. After several meetings, the recommendations of the Commission are passed along to the Prime Minister who returns the final verdict to MITI; MITI in turn passes the judgement along to the electric company.

March, 1970, and a second BWR (1,100 MWe) was begun at Tokai in December, 1972 and is scheduled for completion in October, 1976.[41] JAPCO sells the output of its facilities--which is roughly equivalent to the nuclear output of Kansai Electric--to the private utilities.

Of the private shareholders who own JAPCO, Tokyo Electric and Kansai Electric are particularly prominent. The top executive posts of JAPCO alternate back and forth between "retired" Tokyo and Kansai personnel; for example, when the Chairman of JAPCO is a Kansai man, the President of JAPCO is from Tokyo Electric, and vice versa. JAPCO has been conspicuous in its interaction with the IAEA regarding safeguards as we shall see in Chapter IV; behind this interaction looms the shadow of Tokyo Electric and Kansai who express their views regarding Japan's safeguards policies through JAPCO.

In addition to JAPCO, mention should be made of the Federation of Electric Power Companies which was founded on November 20, 1952 to serve as a communications link between the electric power companies and the Japanese government. The Federation is an "arbitrary" organization--that is, it is not formally established by law but is rather a voluntary creation of the electric power companies which provides a forum wherein the power companies and JAPCO can discuss the utility policies of the government, resolve policy disputes, and achieve consensus regarding policy stands and changes. The majority of the Federation's approximately one hundred and twenty

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[41] Kazuhisa Mori, "Survey of Japanese Nuclear Industry," Nuclear Engineering International, July 1973, pp. 548-550.

employees are paid by the electric companies from which they come and to which--after a two or three year stay at the Federation--they will return. One employee of the Federation described it as a means to "gather many opinions" from the electric companies and JAPCO: the twenty-five member Central Power Council of the Federation merges these opinions into the "decisions of the long term program of the electric power field."

In the early 1970s the Federation had a small safeguards committee to which each electric company sent a representative; this committee is now disbanded--for reasons that we shall explore in Chapter IV--and the Federation now has virtually no involvement with safeguards.

Finally, it should be noted that in conjunction with its role as spokesman for the nuclear industry, the Japan Atomic Industrial Forum (JAIF) has served as a meeting place for various parties interested in safeguards, and has played an active role in the development of safeguards policy in Japan. Many of the activities of this organization regarding safeguards will be examined in Chapter IV. Here it should be emphasized that the Forum has had considerable influence in the realm of safeguards: formally its policy positions are regarded as representative of the consensus of the entire nuclear industry.

5. Reprocessing.

The reprocessing stage of the nuclear fuel cycle is the second stage identified by experts as susceptible to illicit diversion of nuclear material. At the present time, PNC holds a virtual monopoly on the work being done in this realm in Japan:

this monopoly is the result of a consensus in the nuclear industry that the government and a government corporation should undertake the initial effort in this high-risk area. The PNC, its place in the governmental structure and its relationship to international safeguards have been described above and will be examined further in Chapter IV.

6. Waste Disposal.

At this time, Japan is dependent upon foreign cooperation for the disposal of radioactive wastes: consequently Japanese firms are not substantially involved with safeguards pertaining to this stage of the nuclear fuel cycle.

Organizational Structure: Academics

Several universities in Japan are deeply involved with research programs in the field of atomic energy and play a subtle but significant role in nuclear policy formation. Of these universities, Tokyo University (Todai) is by far the most influential. Todai influence is felt in at least two ways: on the one hand, many of the highly placed officials in Japan involved in nuclear energy policy and safeguards are graduates of Todai, and are linked together in an elite and influential clique. On the other hand, prestigious and influential professors of Tokyo University head government advisory committees: a case in point is the government's advisory committee on safeguards chaired by Mukaibo Takashi, an eminent scholar in the Faculty of Engineering at Tokyo University. Of Japan's other universities engaged in nuclear research, two, Kyoto University and Tokyo Institute of Technology have had

peripheral exposure to international safeguards as a result of their maintenance of large research reactors. While in a formal sense, Japanese universities are outside the organizational mainstream of government agencies from which official government policy emanates, in reality, as we shall see, close communications are maintained between the academic world and government organizations regarding safeguards policy and the advisory and consultative functions performed by members of the academic community should not be underrated.

Organizational Structure: Mass Media

Finally, to complete the identification of Japanese organizations involved with safeguards policy, mention should be made of the active role that has been played by the Japanese press. Since the resumption of research regarding nuclear energy in the early 1950s, prominent Japanese newspapers such as Asahi Shimbun, Nihon Keizai, Yomiuri, and Mainichi have consistently provided factual coverage of government policy formation and changes, and printed editorials arguing the pros and cons of nuclear development. One prominent editorial writer for Nihon Keizai Shimbun interviewed for this study noted that he has been engaged in reporting and analyzing policies regarding nuclear energy development since 1954, and that he has been involved with writing about safeguards since the time when the IAEA was established and Japan first became involved in agreements for receiving nuclear material from the Agency.

The press derives its information regarding nuclear policy and safeguards in a variety of ways. Government ministries hold

monthly or bi-monthly meetings attended by the Minister (member of Parliament), Vice Minister (civil servant) and other leading officials and editorial writers from the major newspapers. In addition to the formal sessions, "off the record" meetings are common. Moreover, reporters from the major newspapers are stationed in each ministry and receive formal statements directly from ministry officials. Finally, both formal arranged meetings of individual officials and press members and informal consultations and occasional "leaks" combine to facilitate full coverage of news events, including nuclear policy developments.

Organizational Structure: Inherent Characteristics

The preceding section provides a description of the Japanese organizations that are involved with international safeguards policy. While this description is useful for specifying the formal structure of the Japanese organizational context concerned with IAEA safeguards, it fails to provide any indication of the inherent characteristics of this context which could affect organizational involvement with safeguards. However, research findings indicate that several of the structural characteristics associated with this organizational context may have a direct bearing on IAEA efforts to implement safeguards policy in Japan.

Taken as a whole, the Japanese organizations involved with international sareguards are notably hierarchical. A clear division prevails between service level and professional level employees, and each level or rank within these two categories is clearly defined as are the privileges and limitations associated

with each rank. Many previous studies have documented the hierarchical nature of Japanese organizations in virtually every sphere of Japanese life, and while the point need not be labored here, it is necessary to emphasize that the carefully defined hierarchy of positions within the Japanese organizations involved with international safeguards has important implications for determining the composition of the group of Japanese individuals concerned with safeguards.

As is the case in the International Atomic Energy Agency, the routine bureaucratic functions of the Japanese organizations involved with safeguards--the typing, filing, mailing, etc.--are performed by service level personnel who, in Japan, inevitably seem to be young unmarried girls who remain at their jobs only until they marry. All organizational activities involving decision-making, planning, policy delineation and change, and policy implementation are the domain of the professional level staff who are ranked and graded on the basis of seniority. Generally speaking, each year a new crop of young professionals--almost exclusively men--enters the service of the various organizations identified above, and takes its place on what one senior official called a "kind of an escalator" promotion system. The majority of these newcomers will remain with the same organization until their retirement at the early age of forty five or fifty--at which time some may enter the service of another organization in an executive capacity. At regular intervals the group ascends <u>en masse</u> up one more step of the escalator. Final emergence at the upper levels of the bureaucracy takes between twenty and twenty-five years: those senior officials

not selected for the highest positions in their organizations "retire" and may join other organizations. This policy of lateral entry at the upper levels of government and industrial organizations is a familiar phenomenon to students of Japan, and has been analyzed in a number of scholarly studies.[42]

In part as a result of this promotion system based on seniority, and in part as a result of carefully graded hierarchical organizational structure, ultimate authority for policy formation and determination of organizational goals rests with the senior officials at the top of the organization. While occasional grumblings are heard from younger, lower level professional staff members regarding the tedious and time-consuming nature of the promotion system, the association of organizational authority and position with seniority is a fundamentally unchallenged way of organizational life in Japan.[43]

Within the confines of the established and formal hierarchical ranks of the organization, communication patterns reflect employee awareness of rank and position. Two types of communication tend to prevail: between each level of personnel in the organizational hierarchy formal channels of communication are established and

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[42]See, for example, Chalmers Johnson, "The Reemployment of Retired Government Bureaucrats in Japanese Big Business," Asian Survey 14 (November 1974): 953-965.

[43]The association of rank with seniority pervades every sphere of Japanese life and has been the object of considerable scholarly scrutiny. See, for example, Nakane Chie, Japanese Society (Berkeley, University of California Press, 1970), passim. See also Nakane Chie, "Japanese View of Social Relationships," The East (January 1973): 15-18.

utilized, while within each organizational level communication tends to be less formal and more friendly. For example, it is not uncommon to hear the formal forms of the Japanese language used in discussions between an upper level and a lower level employee of an organization, while employees of the same rank tend to use semi-formal and occasionally--with the intimate members of one's group--informal forms of speech. As a consequence of the existence of these two types of communication, vertical communication--that is, communication between various levels of organizational personnel--is frequently formal, slow and ponderous, with the potential for distortion maximized. However, horizontal communication--communication between employees of the same rank--both within an organization and between organizations tends to be less formal and more direct. Thus inter-organizational communication concerning a given policy tends to occur among personnel of the same organizational rank who frequently may share common goals and policy perspectives. In inter-organizational committee sessions and business meetings this commonality of rank and purpose can serve to promote consensus among the representatives of different organizations.

The prevalence of these various organizational characteristics--life-time employment by one organization, slow promotion, adherence to the seniority system, awareness of organizational rank, and a tendency for inter-organizational communication to transpire between employees of similar rank--has had a discernable impact on determining the composition of the group of men who are involved in safeguards policy in Japan. While their original interest in safeguards may have come as a result of technical training or the

study of nuclear energy, none of these men would be in a position to engage in policy formation regarding safeguards unless they had attained a relatively high position in their respective organizations through observation of the established procedures for advancement. In part because of the "weeding-out" character of the promotion system, the group of men involved with safeguard policy formation in Japan is small and readily identifiable. Most of the members of this group are university graduates--most commonly graduates of Tokyo University--who have been in the service of government, industry or academics for many years, and who have risen slowly in the time-honored way, to high positions of seniority and authority. Although the faces of some individuals peripherally concerned with safeguards have changed from time to time, the membership of the group primarily concerned with Japan's safeguards policies has changed very little: most have been involved with Japan's nuclear development and with safeguards since the mid 1950s. While employed by different organizations, these men nonetheless arrange to meet frequently in both formal and informal settings, and have collectively welded a consensus regarding Japan's position on international safeguards that has been stable in content and is consistent with Japanese goals regarding nuclear development. Moreover, while consistently aware of the organizational interests which they represent, the continuity of membership in this "Safeguards Group" and the long-term familiarity of group members with one another have served to blur organizational lines of distinction and reinforce a sense of group identity. Thus, while there are a number of organizations in Japan involved with safeguards,

organizational diversity is not necessarily reflected in the group of men actually involved with safeguards policy formation. Furthermore, the approach to decision-making utilized by this group is designed to minimize organizational differences to as great a degree as possible.

Safeguards and Japanese Decision-Making

In part as a result of the specialized nature of safeguards policy, necessitating as it does both political and technical expertise, and in part as a result of the structural characteristics of Japanese organizations noted above, the group of men involved with safeguards policy in Japan is a small one. Although, as we have seen, a number of Japanese organizations have some contact with IAEA safeguards efforts, generally speaking there are only a few men at most in each of these organizations that are familiar with safeguards policy. While decision-making and policy formation concerning safeguards is officially the domain of the government--specifically the Science Division of the United Nations Bureau of the Ministry of Foreign Affairs, and the Safeguards Office of the Atomic Energy Bureau of the Science and Technology Agency and ultimately the Japan Atomic Energy Commission--in reality decisions are made by the group of men representing the various organizations identified above. As one Japanese official explained, the initial formal contact point with the IAEA is the United Nations Bureau of Gaimushō. However the staff of the United Nations Bureau is not technically qualified to deal with safeguards issues; hence it acts as a channel, passing on information and communications to

the JAEC, which is also lacking in technical specialists, and to the Director of the Science Division of the United Nations Bureau. The JAEC in turn passes information on to the Director of the Atomic Energy Bureau of the STA, who together with the Director of the Science Division turns to the Government's Special Advisory Committee on Safeguards, which is headed by Dr. Mukaibo of Tokyo University. This Committee, in consultation with the AEB and the Science Division of the United Nations Bureau of Gaimushō, constitutes the core of the Japanese decision-making apparatus involved with safeguards. Established in 1970, the Committee, which meets three or four times a year (and more frequently when negotiations with the IAEA are pending--in November, 1973, the Committee held its twentieth meeting), draws its twenty to twenty-five members from all organizations involved with safeguards, and includes representatives from MITI (head of energy division), the Ministry of Transportation, the Atomic Energy Bureau of the STA, the Science Division of Gaimushō (head of division), an official advisor of the JAEC, Tokyo University (two-three prominent professors from the Department of Nuclear Engineering), the Federation of Electric Power Companies, JAPCO (two), PNC (Vice-President), JAERI (Vice-President), Toshiba, Furukawa, Mitsubishi Metal and Mining, Sumitomo Nuclear Power Industries, Hitachi, Mitsui Nuclear Industries, Japan Nuclear Fuel, Japan Petroleum Company, and the Japan Atomic Industrial Forum.

The timing behind the establishment of this Committee and the diversity of its membership are more than haphazard or incidental: as we shall see, 1970 was a year when the issue of safeguards was

particularly salient in Japan and the establishment of the Safeguards Committee by the Japanese Government represents one manifestation of a typical operating procedure of the government. As one official noted, when the government is confronted with an issue requiring a policy decision, it usually establishes a committee composed of all interested parties concerned with the issue. Thus, the committee represents a very important unit in the government's decision-making mechanism, for rarely will policy be formulated until the recommendations of the committee are heard. Moreover, the composition of the committee is very important, for all parties involved with the issue must be included; the ultimate aim is to bring together all divergent views and out of the differences expressed mold one policy agreed to by all. The key notion behind this type of decision-making is consensus-building.

As a variety of other studies have documented, consensus decision-making represents the fundamental decision-making approach utilized in most spheres of Japanese life--including governmental, industrial and academic--to resolve disputes and formulate policies. In general the approach employed to achieve ultimate consensus involves a number of steps. At the outset, the government supplies an initial draft representing the "original way of thinking" which includes policy aims, obstacles and alternatives. This draft is then explained to and discussed by the various members of the committee established to advise the government. It soons becomes apparent which members of the committee are the most critical of the government's draft, and initial attention is directed to mollifying the strongest criticism. A second draft is drawn up with

these criticisms in mind. Attention is then directed to the second most severe level of criticism--a series of drafts and a series of meetings follow until final consensus is achieved, and all divergent views are reconciled.

This consensus-building approach to decision-making carries with it a number of important implications for outsiders--including the IAEA--who come in contact with this approach. The process of consensus-building--of discussion, negotiation, compromise--can be a fairly laborious and time-consuming one. Yet, once consensus is finally achieved, the policy which emerges as a result of agreement among divergent views is generally a stable one and serves as the on-going basis for government action until such time as a need to change is agreed upon by a significant proportion of those involved with the policy. Interestingly, however, despite the generally time-consuming nature of consensus-building decision-making, this approach can include a surprising degree of flexibility and speed, for in times of urgent need or crisis the views of interested groups are well known and minor objections and criticisms can be put aside in the interests of reconciling major differences. Thus, policy which has been consistent and stable for a considerable period of time can, in times of crisis and perceived urgent need, literally change overnight. The change in Japanese policy toward Israel during the 1973 Arab oil embargo, characterized by an abrupt withdrawal of support for the Jewish state at the insistence of the Arab nations, is one example of the degree of flexibility which can characterize consensus-building decision-making.

Although consensus-building involves the bringing together and

reconciliation of divergent viewpoints, it should be noted that this approach to decision-making is based on a rather fragile and narrowly defined notion of divergent: this approach can succeed only when there is fundamental agreement among the participants that the policy or action under contemplation is necessary and desirable (in either its presence or absence). Thus, the "how," "when," and "who" may be in question, but the "why" is understood and implicitly agreed upon. One Japanese official noted that it is very difficult to bring "those on the outside" or those with totally opposite views into the circle of decision-makers, and that inclusion of those in total opposition to a given policy or action being considered could destroy the entire process of consensus-building.

The implications of this tendency to exclude those in total opposition to a particular government policy or action from the decision-making realm are serious. At best, the absence of legitimate channels for the expression of opposition produces frustration and bitterness among critics that can lead to violent outbursts and rebellions. Moreover, at times this policy of exclusion can prove dysfunctional for those who foster it, for if an opponent happens to be an occupant of a powerful position this individual may be able to almost single-handedly block the progress of policies supported by the broad consensus of a particular group. An excellent example of this kind of occurence is, as we shall see, provided by the movement in Japan for the establishment of a national safeguards center that was successfully delayed primarily by the opposition of one politician despite the support expressed for such a center by a number of government bureaucrats, and industrial and academic

representatives.

While many of the boundaries of safeguards policy in Japan have been determined by the members of the Government's Special Advisory Committee, a number of other gatherings and meetings have also provided opportunities for the delineation of policy in this realm. For example, in the spring of 1972, the JAIF formed a Special Committee on the Non-Proliferation Treaty which has considered in some detail various aspects of safeguards policies.[44] The Board of Directors of the Nuclear Materials Control Center, the Center established as the prototype of a national safeguards center, has conducted lengthy discussions concerning safeguards. Innumerable informal meetings--over lunch or cocktails--are an integral part of the decision-making process underlying Japan's safeguards policies. Yet, while the settings change and the subset of faces in various meetings may change, the composition of the total group of men involved with safeguards policy has remained remarkably consistent for the past two decades. The continuity of membership in this safeguards group, together with the organizational positions held by the various members and their orientation toward consensus-building in decision-making combine to provide considerable influence on the potential of specific individuals to have an impact on the nature of the safeguards policy they define.

Safeguards and Japanese Personnel

In the discussion in Chapter II regarding the potential of

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[44]"JAIF's NPT Special Committee Holds First Meeting Under Doko's Chairmanship," JAIF Weekly, AEC AM-EMB unofficial translation, June 12, 1972.

various individuals in the IAEA to have an impact on the nature of safeguards policy we noted that this potential is presumed to be a function of both organizational characteristics and individual qualities. Organizational characteristics define the parameters within which an individual may function, while personal characteristics unique to the individual determine the nature of his actions within this defined sphere.

If we consider the various organizational characteristics suggested in Chapter II as instrumental in defining the dimensions for individual activity regarding a given policy--organizational role and position in the organizational hierarchy, channels of communication, access to policy makers, and influence--unquestionably the most influential in determining the authorized organizational sphere for individual action regarding safeguards policy in Japan is that of organizational role and position in the organizational hierarchy. All organizational elements required to engage in policy formation--access, influence, sufficient information, and the like--are associated exclusively with the executive positions in Japanese organizations and there is little expectation for any significant involvement with policy making among those younger men at the lower levels. Consequently high organizational rank is the sine qua non in defining the potential for individual input into safeguards policy in Japan.

The men who comprise the group of safeguards policy makers in Japan are indeed, as noted above, senior officials or in executive positions in their respective organizations. While they receive support from lower level professional staff employees who may

handle administrative details or engage in technical research regarding safeguards, the bulk of the burden for delineating Japan's safeguards policy belongs to these senior officials. In many respects, these men form a homogeneous group. Many are graduates of Tokyo University. Many have had some overseas experience, either as students, industrial representatives or diplomats, and therefore have some command of a language other than Japanese--usually English. Although they do not hold the highest positions in their respective organizations, most are senior officials, engineers or scholars who are frequently managers or chief administrators of their organizational subunits. Of the five men consistently identified as the primary authors of Japan's safeguards policy, all are over the age of forty-five, and have considerable experience with Japanese nuclear development, generally dating from the mid 1950s.

Within this generally homogeneous group, however, some members are clearly more equal than others and appear to have had a greater impact than others on the nature of Japan's safeguards policy. Several explanations for this situation were offered during the course of interviews in Japan which seemed to emphasize the role of individual personal characteristics in the safeguards policy making process. In particular, two variables--level of expertise, and command of the English language and therefore ability to communicate with IAEA personnel--were repeatedly mentioned as enhancing the ability of some individuals to assume dominant roles in the process of safeguards policy formation. The personal motivation underlying both the acquisition of these skills and the slow progress

of the individual to a position of responsibility was an unacknowledged but essential factor contributing to individual leadership regarding safeguards policy. Individual perception of organizational role is undoubtedly also an important factor, for this perception enables the individual to determine the legitimate parameters for individual initiative associated with his position in his organization. Perceived potential for advancement may be a lesser consideration in determining the actions of these individuals, for each has already attained considerable status.

Although the realm of safeguards policy appears to offer several Japanese considerable opportunity for individual input into the policy making process, it should immediately be added that the method of decision-making utilized in this process serves to obfuscate rather than emphasize individual contributions. Only those individuals party to the on-going process of safeguards policy formation are aware of individual policy positions and biases. The ultimate emergence of policy based on group consensus obscures individual input and negates individual responsibility for policy provisions. The contours of policy as well as the outcomes of the policy become a collective responsibility. Thus while members of the group of men involved with safeguards policy formation in Japan are able to identify certain individuals who have assumed dominant roles in the policy making process, the specific inputs of these individuals to safeguards policy are frequently imperceptible to an observer outside of this group.

In sum, it could be said that the individuals in Japan involved with safeguards policy formation bear at least some resemblance to

those individuals in the International Atomic Energy Agency similarly engaged. Both groups of men occupy executive professional positions in their respective organizations. Moreover, the authority associated with their organizational roles is reinforced by the structure and the standard operating procedures of the organizations to which they belong, for in both the IAEA and the Japanese organizations involved with safeguards, hierarchical structural characteristics and operating routines serve to maximize the responsibility of those at the highest professional staff levels for policy formation. Finally, the majority of members of both groups have been involved with safeguards policy for a number of years, and have considerable experience in this realm. The extent to which these similarities have fostered a sense of camaraderie among these men as opposed to a feeling of subtle opposition will be explored in Chapter IV.

CHAPTER IV

INTERNATIONAL SAFEGUARDS AND ORGANIZATIONAL INTERACTION

The capacity of an international organization to carry out the functions and responsibilities assigned to it by its nation-state members is influenced by a number of factors, both internal and external to the organization. In Chapter I, it was suggested that among the various determinants of the ability of an international organization to execute its functions, one important factor may be the nature of the organizational interaction which results from attempts by the international organization to implement a given policy in a specific nation. This interaction is in turn influenced by the nature of the organizations involved at both the international and national levels, and is affected in part by the structural characteristics, decision-making techniques, and individual staff members of these organizations. In Chapters II and III, we focused on the internal characteristics of the International Atomic Energy Agency and certain Japanese organizations which have become involved in the on-going efforts of the IAEA to execute the safeguarding responsibilities assigned to it in its Statute and reaffirmed in the provisions of the Treaty on the Non-Proliferation of Nuclear Weapons. Here we shall turn to an examination of the interaction which has transpired between the IAEA and Japanese organizations during the years of Agency involvement with safeguards in Japan. After tracing the course of this interaction, we will attempt to

discover the extent to which this interaction reflects the internal characteristics of the Japanese organizations involved and is affected by the nature of these organizations. We will then, in Chapter V, attempt to assess the implications of this interaction vis-a-vis the capacity of the IAEA to implement international safeguards in Japan and the extent to which the Agency's experience in Japan can provide some insight into the future of the IAEA and its role in the international system.

PART ONE

International Safeguards in Japan: Organizational Interaction

The organizational interaction which has transpired between the Japanese and the IAEA regarding Agency attempts to apply international safeguards in Japan can be divided into two distinct segments: interaction which has occurred in regard to non-NPT international safeguards and interaction which involves safeguards connected with the NPT. The interaction which has transpired in regard to non-NPT safeguards can be regarded as representative of an experimental and developmental stage in the evolution of international safeguards, while the interaction which involves NPT safeguards is both a function of earlier interaction regarding non-NPT safeguards and an attempt to refine and modify an already existing international safeguards policy.

When the Japanese government filed its request with the IAEA in 1958 for the Agency to provide three tons of natural uranium for a Japanese-built research reactor, the new international organization had not yet defined any policies or procedures that would enable it

to comply with its statutory mandate to apply safeguards to all the nuclear material it supplied. Thus, the provisional safeguard procedures which were defined by the Agency to apply to its first transfer of nuclear material to a member-state[1] can be regarded as a produce of organizational improvising, designed to serve as a stop-gap measure to provide the Agency with the time required to delineate a more complete set of safeguard routines. These initial safeguard measures provided simply for the transmittal to the Agency of design information regarding the facility receiving the nuclear material and semi-annual reports regarding the location and use of the material after it was received in Japan.[2]

A number of considerations combined to reinforce the willingness of the Japanese government to accept and comply with the safeguard provisions attached by the IAEA to the nuclear material it supplied in the late 1950s. Foremost among these considerations was the desire of the Japanese to promote the postwar recovery and development of their economy. The economic promise of nuclear development appeared multifacted: on the one hand, development of nuclear energy seemed to promise one means of minimizing Japan's dependence on foreign energy sources. Moreover, involvement with nuclear development appeared to be one way to promote domestic research and development projects and to enhance the quality of Japanese technology. Finally, the diversity of facilities and

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[1] The Texts of Instruments Connected with the Agency's Supply of Uranium to Japan, IAEA document INFCIRC/3, 15 April, 1959, passim.

[2] Ibid., p. 13

equipment associated with nuclear development and the expected annual increase in international demand for these products offered new potential for industrial activity and invited the exploration of new market and trade possibilities. Thus, for a nation just beginning to regain its economic strength in the wake of the devastation wrought by World War II and anxious to expand the dimensions of its involvement with nuclear research, acceptance of the modest safeguards arrangements attached by the IAEA to the nuclear material it provided to Japan in 1959 was regarded as an inescapable and reasonable cost of international cooperation.

Japanese willingness to accept the initial safeguards provisions defined by the IAEA was reinforced by several considerations other than those related to economic development. By the end of the 1950s, Japan had been accepted as a member of a number of international organizations; involvement in international organizations was perceived by the Japanese as one means whereby Japan could reestablish itself as a member of the international community and begin to replace the shame of wartime defeat with a measure of national pride and respect. Thus Japanese membership in the IAEA and its acceptance of Agency safeguards afforded the Japanese an opportunity to reassert the peaceful motives underlying Japanese involvement with nuclear research and development and reassure the international community that this involvement did not signal a resurgence of militarism in Japan. Furthermore, acceptance of Agency safeguards was based in part on the pragmatic awareness of the Japanese that Japan lacked the economic and military wherewithal to pursue independently its policies in the international system,

and as a dependent of the superpower firmly supporting the development of international safeguards by the IAEA, had no choice but to accept whatever conditions the Agency imposed.

Finally, Japanese acceptance of international safeguards was rendered more palatable by the limited number of organizations in Japan initially affected by this policy. As one highly placed Japanese official noted, at the time when safeguards were first introduced into Japan only two organizations--the Science and Technology Agency, and the Japan Atomic Energy Research Institute--were directly involved with this policy. Although the Ministry of International Trade and Industry was the government organ initially entrusted with the responsibility of overseeing Japan's nuclear affairs and was one of the first Japanese organizations to come in contact with the concept of international safeguards, the establishment of the Science and Technology Agency (STA) in 1956 enabled Ministry of International Trade and Industry (MITI) officials to transfer their responsibilities involving the IAEA and its new safeguards policy to the International Cooperation Division of the Atomic Energy Bureau of the STA. Thus, by the time the IAEA completed the transfer of natural uranium to Japan in 1959, only the International Cooperation Division and the recipient organization, the Japan Atomic Energy Research Institute (JAERI) (under the administrative control of the STA) were affected by the safeguard provisions attached by the Agency to this material. The modest nature of these provisions combined with their minimal impact on the operations of the Japanese organizations involved and the desire of the Japanese to promote the development of nuclear energy research

in Japan all served, as one Japanese official observed, to keep "discussion of safeguard matters in Japan at (the) original stage at a very theoretical level."

The years immediately following this first provisional application of international safeguards by the IAEA to an Agency project agreement were characterized by halting progress for both the Agency in its attempts to delineate a more defined set of safeguard principles and procedures and for the Japanese in their attempts to foster domestic research and development regarding atomic energy. While the staff of the Agency's Secretariat and members of the Board of Governors were engaged in discussing the provisions which were included in the Agency's first safeguards system, the text of which was published in March, 1961 (see Appendix 1), the Japanese were beginning to experience the setbacks and delays in their nuclear program which seemed to beset virtually all states in the early years of international involvement with nuclear development. By the early 1960s, the enthusiasm which had characterized the initial postwar resurgence of interest in nuclear research and development in Japan had given way to urgings from industrial, governmental and academic circles for a "go-slow" philosophy,[3] and this new conservatism was reflected in the modest goals included in the Long-Range Program on Development and Utilization of Atomic Energy, adopted in 1961 by

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[3]See, for example, "Japan's A-Energy Industry at Turning Point," Nihon Keizai, Daily Summary of the Japanese Press (DSJP), January 26, 1960, p. 20, and "A-Power Development Coming to a Standstill, Asahi, DSJP, February 26, 1960, p. 16.

the Japan Atomic Energy Commission.[4] The halting progress which characterized the early years of Japan's postwar experience with nuclear energy tended to discourage or postpone a rapid increase in the number of Japanese organizations intensely engaged in nuclear development, and the concept and policy of international safeguards remained of low salience in Japan, affecting only a few operations in two or three organizations.

In September, 1963, as was previously noted, Japan was instrumental in initiating IAEA involvement with safeguards unrelated to Agency project agreements, namely, safeguards involving trilateral arrangements whereby safeguards responsibilities are transferred from the state supplying nuclear material to the IAEA. This first trilateral agreement involved the United States, Japan and the Agency; while the Director General of the IAEA, Sigvard Eklund, hailed the occasion as an important development in the Agency's safeguards program, the Japanese regarded the agreement as an inevitable consequence of their need for foreign supplies of nuclear material to further domestic research and development, and their extraordinarily close ties with the United States, which, from the inception of the IAEA had urged and supported the development of a program of international safeguards by the Agency. This feeling of "shigata ga nai"--

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[4]See Japan Atomic Energy Commission, "Needs to Nuclear Power Generation and the Related Programme in Japan," Proceedings of the Third International Conference on the Peaceful Uses of Atomic Energy, 31 August - 9 September, 1964 (New York, United Nations, 1965), pp. 98-99. See also Victor Gilinsky and Paul Langer, The Japanese Civilian Nuclear Program (California, The Rand Corporation, August, 1967), passim.

"it cannot be helped"--tended to underlie the subsequent involvement of the Japanese in additional transfer agreements: by the middle of 1972, the Japanese were involved in long-standing trilateral agreements with the United States, Great Britain and Canada, as well as newly signed agreements with Australia and France. These trilateral agreements together with the revised and expanded versions of the Agency safeguards system published in 1965, 1966 and 1968 provide the legal basis upon which the IAEA has gradually expanded the scope of its safeguards coverage in Japan. Today, IAEA safeguards, as defined in INFCIRC/66/Rev. 2 (see Appendix 2), are applied to approximately ninety-five percent of all nuclear material known to be in Japan. It should be emphasized here that these safeguards are not related to the Non-Proliferation Treaty.

The gradual trend toward expanded international safeguards coverage of nuclear material in Japan has been accompanied by a gradual increase in the number of organizations in Japan affected by this coverage. With the slowly expanding scope of Japan's nuclear program and its increasing complexity, both the total number and the diversity of organizations involved with nuclear development in Japan have increased correspondingly. Hence, while IAEA provisional safeguards affected only two Japanese organizations in 1959, by 1974, with the conclusion of trilateral agreements and the delineation of an expanded system of international safeguards as defined in INFCIRC/66/Rev. 2, the number of Japanese organizations and the range of the activities of these organizations affected by Agency safeguards had increased significantly. Thus it could be said that the IAEA's safeguards program and the Japanese organizations

involved with nuclear energy developed and matured concurrently: as the dimensions of Agency safeguards measures expanded, so also did the dimensions of the Japanese organizational context to which these measures were applicable. Tables 17, 18 and 19 provide one indication of the dimensions of Agency safeguards involvement in Japan as of 30 June 1972: these tables lend credence to the Japanese statement that over one half of the total safeguards effort of the Agency is directed at Japan.

As the amount of nuclear material in Japan and the number of organizations directly involved with nuclear development increased over the years and as the system of international safeguards administered by the IAEA expanded to provide coverage of an increasing range of organizational activities related to nuclear material, the Japanese and the Secretariat of the IAEA sought to establish operating routines to facilitate their interaction involving safeguards. These routines can be categorized into two main groups: namely, those relating to the physical handling of nuclear material and the operation of nuclear facilities, and those related to the negotiations involving NPT safeguards, which have intensified since the implementation of the Non-Proliferation Treaty in 1970. The first set of routines can be regarded as the standard operating procedures established between the Agency and the Japanese over the years to provide a basis for the interaction necessitated by the safeguards system presently administered by the Agency; the second set of routines represents the means whereby the organizations involved are attempting to define modified procedures on which to base future interaction.

TABLE 17

NUCLEAR INSTALLATIONS UNDER AGENCY SAFEGUARDS OR CONTAINING SAFEGUARDED MATERIAL

AS OF JUNE 30, 1972

A. Reactors[a] other than power reactors

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
Argentina	RA-0/Argentine Reactor 0	Cordoba	Tank	.00	x
	RA-1/Argentine Reactor 1	Constituyentes	Argonaut	.10	x
	RA-2/Argentine Reactor 2	Constituyentes	Argonaut	.00	x
	RA-3/Argentine Reactor 3	Ezeiza	Pool-tank	5.00	x
	SUR-100	Rosario	Solid-homogeneous	.00	
Australia	HIFAR	Lucas Heights, N.S.W.	Tank	10.00	x
	MOATA	Lucas Heights, N.S.W.	Argonaut	.10	x
	CRITICAL FACILITY	Lucas Heights, N.S.W.	Crit. Fac.	.00	
Austria[b]	SAR Argonaut	Graz	Argonaut	.001	x
	Austria Triga Mark II	Vienna	Triga II	.25	x
	Astra	Seibersdorf	Pool	12.00	x
Brazil	IEAR-1	Sao Paulo	Pool	5.00	x
	TRIGA-1	Belo Horizonte	Triga I	.03	x
	ARGONAUT	Rio de Janeiro	Argonaut	.01	x
Bulgaria[b]	IRT-2000	Sofia	Pool	2.00	x
Canada[b]	NRX Reactor	Chalk River, Ont.	NRX	30.00	x
	NRU Reactor	Chalk River, Ont.	NRU	125.00	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
	WR-1 Reactor	Pinawa, Manitoba	Organic-cooled	60.00	x
	McMaster Nuclear Reactor	Hamilton, Ont.	Pool-type	2.5	x
	Slowpoke-1	University of Tor.	Pool-type	.005	x
	Slowpoke-2	Ottawa, Ont.	Pool-type	.020	x
	PTR	Chalk River, Ont.	Pool-type	.0001	x
	ZED-2	Chalk River, Ont.	Pool-type	.0002	x
Chile	Herald Reactor	Santiago	Herald	5.00	
China	THOR/Tsing Hua Open Pool Reactor	Hsin-chu	Pool	1.00	x
	Taiwan Research Reactor Facility	Huaitzupu	NRX	40.00	
	ZPRL/Zero Power Reactor	Lung-Tan	Pool	.00	x
Colombia	IAN-R1	Bogota	Light-water	.10	x
Czechoslovak Socialist Republic[b/]	SR-0	Vochov	CA	.00	x
	VVR-S Research Reactor	Rez	Tank	4.00	x
	TR-0 Critical Assembly	Rez	CA	.00	
Denmark[b/]	DR-1	Risø	Homogeneous	.002	x
	DR-2	Risø	Pool	5.00	x
	DR-3	Risø	Tank	10.00	x
Finland[b/]	FiR-1	Otaniemi	Triga II	.25	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
German Democratic Republic[b]	WWR-S(m)	Rossendorf	Tank	6.00	x
	Rake II	Rossendorf	Tank	10.00	x
	RRR	Rossendorf	Critical Ass.	.5	x
Greece[b]	GRR/Greek Research Reactor	Athens	Pool	5.00	x
Hungary[b]	WWR-SM	Budapest	Tank	5.00	x
	ZR-4	Budapest	CA	.00	x
	ZR-6	Budapest	CA	.00	x
	Training Reactor	Budapest	Tank	.01	x
Indonesia	TRIGA II/Bandung	Bandung	Triga II	1.00	x
Iran	UTRR	Teheran	Pool	5.00	x
Iraq[b]	No name (IRT-2000 type)	Baghdad	Pool	2.00	x
Israel	IRR-1	Yaven	Pool	5.00	x
Japan	JRR-2/Japan Research Reactor 2	Tokai-Mura	Tank	10.00	x
	JRR-3/Japan Research Reactor 3	Tokai-Mura	Tank	10.00	x
	JRR-4/Japan Research Reactor 4	Tokai-Mura	Pool	1.00	x
	JPDR/Japan Power Demonstration Reactor	Tokai-Mura	Boiling-water	90.00	Under reconstruction
	SHCA/Semi-Homogeneous Crit. Assembly	Tokai-Mura	Crit. Fac.	.00	x
	AHCF/Aqueous Homogeneous Crit. Facility	Tokai-Mura	Crit. Fac.	.00	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
	TCA/Tank-type Crit. Ass.	Tokai-Mura	Crit. Fac.	.00	x
	Rikkyo University Research Reactor	Tokosuka-shi	Triga II	.10	x
	Musashi College of Technology Res. Reactor	Kawasaki-shi	Triga II	.10	x
	Kinki University Research Reactor	Fuse-shi	UTR-B	.00	x
	TTR/Toshiba Training Reactor	Kawasaki-shi	Pool	.03	x
	HTR/Hitachi Training Reactor	Kawasaki-shi	Pool	.10	x
	HCA/Hitachi Critical Ass.	Kawasaki-shi	Crit. Fac.	.10	x
	Nippon Atomic Industry Group Crit. Assembly	Kawasaki-shi	Crit. Fac.	.00	x
	KUR/Kyoto University Research Reactor	Kumatori-cho	Pool	1.00	x
	JMTR-CA/Japan Meterial Testing Reactor Crit. Fac.	Tokai-Mura	Crit. Fac.	.00	x
	FCA/Fast Critical Assembly	Tokai-Mura	Crit. Fac.	.00	x
	JMTR/Japan Material Testing Reactor	Oarai	Tank	50.00	x
	Mitsubishi Crit. Facility	Ohmiya-Saitana	Tank	.00	x
	Deuterium Critical Assembly	Oarai-Ibaraki	Tank	.00	
	TODAI Research Reactor	Tokai-Mura	Fast Neutron Source Reactor	.002	x
Korea, Republic of	TRIGA II/Seoul	Seoul	Triga II	.10	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
Mexico	National Institute of Nuclear Energy Reactor	Mexico City	Triga III	1.00	x
Norway[b/]	JEEP-II	Kjeller	Tank	2.00	x
	HBWR	Halden	HBWR	25.00	x
Pakistan	PRR/Pakistan Research Reactor	Rawalpindi	Pool	1.00	x
Philippines	PRR-1/Philippine Research Reactor	Diliman, Quezon City	Pool	1.00	x
Poland[b/]	EQA	Świerk	Tank	8.00	x
	Maryla	Świerk	CA	.00	x
	Anna	Świerk	CA	.00	x
	Agata	Świerk	CA	.00	x
Portugal	RPI/Portuguese Research Reactor	Sacavem	Pool	1.00	x
Romania[b/]	VVR-S	Margurele	Tank	3.5	x
	Helen	Margurele	SCA	.00	x
South Africa	SAFARI-1	Pelindaba	Tank	20.00	x
Spain	JEN-1	Madrid	Pool	3.00	x
	JEN-2	Madrid	Pool	.001	x
	CORAL-1	Madrid	Fast Cri. Fac.	.00	x
	ARBI	Bilbao	Argonaut	.01	x
	ARGOS	Barcelona	Argonaut	.01	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
Sweden	R2	Studsvik	MTR Tank	50.00	x
	R2-0	Studsvik	Pool	1.00	x
	KRITZ	Studsvik	Tank	.00	x
	R-0	Studsvik	Pool	.00	x
	Agesta	Stockholm	PHWR	80.00	x
Switzerland	Proteus	Wurenlingen	Fast thermal CA	.00	
	Saphir	Wurenlingen	Pool	5.00	x
	Diorit	Wurenlingen	HW	30.00	
	Crocus	Lausanne	CA	$.10^{-3}$	x
	AGN201P	Geneva		.00	x
	AGN211P	Basel	Pool	.00	x
Thailand	TRR-1/Thai Research Reactor 1	Bangkok	Pool	1.00	x
Turkey	TR-1	Istanbul	Pool	1.00	x
United Kingdom	Zebra Fast Critical Ass.	Winfrith	Crit. Fac.	.00	x
Uruguay[b/]	URR/Uruguay Research Reactor	Montevideo	Lockheed	.10	
Venezuela	RV-1	Caracas	Pool	3.00	x
Viet-Nam	VNR-1/Viet-Nam Res. Reactor 1	Dalat	Triga II	0.25	x

TABLE 17

(cont'd)

State in which located	Name of reactor	Location	Type	Capacity MW(th)	In operation
Yugoslavia[b/]	Triga Mark II/Yugoslav Res. Reactor	Ljubljana	Triga II	0.25	x
	RA	Vinca	Heavy-water	6.5	x
	RB	Vinca	Crit. Fac.	.00	x
Zaire, Republic of[b/]	Triga Mark II	Kinshasa	Triga II	1.00	(Final stage of construction)

[a/] As defined in documents INFCIRC/26, Part II, para. 14 and INFCIRC/66/Rev.2, Part IV, para. 80.

[b/] NPT Safeguards Agreement.

Source: IAEA Document GC(XVI)/480, 1972, pp. 48-50.

TABLE 18

NUCLEAR POWER STATIONS UNDER AGENCY SAFEGUARDS AS OF JUNE 30, 1972

State in which located	Name of power station	Location	Type	Capacity MW(th)	In operation
Canada[b/]	Pickering Generating Station	Pickering, Ontario	Candu	2000	x
	NPD Generating Station	Ralphton, Ontario	Candu	22	x
	Gentilly Power Station	Gentilly, Quebec	Candu	250	x
	Douglas Point Power Station	Kincardine, Ontario	Candu	208	x
Czechoslovak Socialist Republic[b/]	Nuclear Power Plant Bohunice	Taklovske	HWGC	150	
German Democratic Republic[b/]	Rheinsberg N. P. S.	Rheinsberg	PWR	80	x
India	Tarapur Atomic Power Station	Tarapur	BWR	380	x
	Rajasthan Atomic Power Station	Rajasthan	Candu	400	
Japan	Tokai-Mura Nuclear Power Station	Tokai-Mura	Magnox	185	x
	Tsuruga Nuclear Power Station	Tsuruga	BWR	320	x
	Mihama-1 Nuclear Power Station	Mihama-Fukui	PWR	340	x
	Fukushima-1 Nuclear Power Station	Ohkumo-Fukushima	BWR	460	x
	"Mutsu" Nulcear Ship	Harbour near Mutsu City	PWR	36	
	Mihama-2 Nuclear Power Station	Mihama-Fukui	PWR	500	
Pakistan	Karachi Nuclear Power Project	Karachi	Candu	137	x

TABLE 18

(cont'd)

State in which located	Name of power station	Location	Type	Capacity MW(th)	In operation
Spain	"José Cabrera" Nuclear Power Station	Almonacid de Zorita	PWR	160	x
	Santa Maria de Garona Nuclear Power Station	Santander	BWR	450	x
Sweden	Oskarshamn	Oskarshamn	BWR	440	x
Switzerland	Mühleberg	Mühleberg	BWR	306	x
	Beznau I		PWR	350	x
	Beznau II		PWR	350	x

b/ NPT Safeguards Agreement.

Source: IAEA Document GC (XVI)/480, 1972, p. 51.

TABLE 19

CONVERSION PLANTS, FABRICATION PLANTS AND CHEMICAL REPROCESSING PLANTS UNDER AGENCY SAFEGUARDS AS OF JUNE 30, 1972

Argentina	Pilot Fuel Reprocessing Plant, Ezeiza Pilot Fuel Fabrication Plant, Constituyentes, A Pilot Scrap Recovery Plant, Buenos Airea
Brazil	Fabrication Facility, Metallurgy Department, Institute de Energia Atomica, São Paulo
Canada[b/]	Eldorado Nuclear Limited Port Hope Refinery Westinghouse Fuel Fabrication Plant Canadian General Electric Pelletizing Facility Canadian General Electric Fabrication Plant
Czechoslovak Socialist Republic[b/]	Uranium Industry Chemical Plant, Mydlovary Nuclear Fuel Institute, Zbraslav
Denmark[b/]	Metallurgy Department, Risø
Japan	Sumitomo Electric Industry (Kumatori-1) Furukawa Electric Industry (Takeyama-1) Mitsubishi Atomic Power Industry (Ohmiya-1) Japan Nuclear Fuel Corporation Mitsubishi Nuclear Fuel Co.
Norway[b/]	Fuel Element Pilot Production Plant, Kjeller
Spain	Pilot Reprocessing Plant, Juan Vigon Research Centre, Madrid Metallurgical Plant, Juan Vigon Research Centre, Madrid
Sweden	ASEA-ATOM, Vasteras

[b/] NPT Safeguards Agreement.

Source: IAEA Document GC(XVI)/480, 1972, p. 52.

The routines which provide the present basis for IAEA-Japanese organizational interaction have evolved in rather piecemeal fashion since the late 1950s and can be regarded as an attempt by the international organization to cope with some degree of consistency with an increasing set of safeguards responsibilities in an increasingly complex national organizational context. This effort by the Agency to achieve a measure of consistency in its safeguarding activities appears to reflect a tendency to rely on past practices as a guide for future action.

At the time when the Agency was established there were no clear pre-established guidelines to aid its staff in their efforts to execute the statutory mandate called safeguards. Rather there was simply the notion, originating primarily in the United States, that a variety of nation-states would seek to exploit the military and economic potential of nuclear energy, that the unregulated spread of nuclear material across the globe was dangerous and undesirable, and that some form of international monitoring of nuclear material was essential. Monitoring of nuclear material in the United States, as administered by the United States Atomic Energy Commission, involved the collection of a variety of information, including design information regarding nuclear facilities as well as operating data, and took the form of both reports and AEC inspections. Thus, when initially confronted with the task of implementing some form of international safeguards, Agency personnel adopted these national safeguards procedures, and information gathering based on nation-state reports and Agency inspections became the basis for the implementation of international safeguards. As time passed and

the Agency became involved in an expanded safeguards effort through the conclusion of an increasing number of project agreements, trilateral agreements and the extension of safeguards coverage to additional stages of the nuclear fuel cycle, the practice evolved, as we noted in Chapter II, of patterning each individual safeguards agreement as closely as possible along the lines of the last previous agreement of the same type. This practice can be regarded as an attempt by the IAEA to utilize its past safeguards experience and practices as a means of achieving some degree of consistency in its efforts to expand safeguards coverage. Moreover, the practice of utilizing past safeguards agreements as guidelines for the extension of international safeguards to an increasing number of states was accompanied by a tendency to utilize existing safeguards procedures within a given state as the basis for expanding safeguards coverage within the state. Thus, once the Agency had developed safeguards for one nuclear facility within a state it was able to utilize these procedures as the basis for expanding its coverage to other facilities. This approach enabled the Agency to minimize the uncertainty involved in the application of safeguards for both its staff and the member-state submitting to safeguards and to emphasize the routine aspects of safeguards administration.

In Japan the application of provisional safeguards measures to the transfer of nuclear material by the Agency in 1959 and the designation of the International Cooperation Division of the Atomic Energy Bureau of the Science and Technology Agency as the appropriate governmental unit for handling contact with the IAEA established both the precedent and the initial mechanism on which to base the

subsequent steady expansion of Agency safeguards. The existence of this precedent combined with a number of factors, mentioned above, including the slow pace which initially characterized Japanese nuclear development and organizational involvement with this development, the consistent but gradual rate at which Agency safeguards were extended to a growing number of Japanese organizations, and the tendency of the Agency to rely on established procedures and channels for the extension of safeguards to new facilities, all served to reinforce the establishment and perpetuation of organizational routines to provide a basis for the interaction between the Agency and the Japanese regarding safeguards.

By the late 1960s most of the routines through which contact between the Agency and the Japanese occurs regarding safeguards implementation had evolved, and the procedures underlying the continuous interaction which transpires between the Agency and Japanese organizations were firmly established. These procedures relate to the exchange of information between the international organization and Japanese organizations as well as to the direct inter-personal contact which takes place between staff members of these organizations; many of these procedures, the sum of which comprises the routine organizational interaction which transpires between the Japanese and the IAEA regarding safeguards, prevail today, and include:

1) The initial channeling of all official Agency communications and personnel involved with Agency safeguards implementation through the Safeguards Office (established 1970) of the International Cooperation Division of the Atomic Energy Bureau.

2) The arrival of two inspectors from the IAEA in Tokyo each month; each of these inspectors is accompanied by a staff member of the Safeguards Office or some other division of the Atomic Energy Bureau throughout the course of his inspection activities. Japanese nuclear facilities are inspected on the basis of pre-arranged terms which specify the number of inspections and the intensity of inspections (in man-hours or man-days) for each facility. In late 1973 the IAEA had seven inspectors designated for Japan and it was expected that the number would soon increase to eight. In commenting upon the frequency of Agency inspection one Japanese official noted "probably IAEA inspectors are always in Japan." Table 20 shows the increase in recent years in both the number of Japanese facilities inspected by IAEA personnel and the increase in the number of man-days devoted by Agency inspectors to these facilities. It should be noted that while this table indicates an increase in both the total number of facilities inspected and in the number of inspections conducted, the ratio of number of inspections/total facilities declines significantly between 1965 and 1973. While this decline could be interpreted an an indication of an over-all reduction in the intensity of Agency efforts to apply safeguards in Japan, such as interpretation should be tempered by the awareness that there is no basis here for distinguishing between the size and nature of facilities being safeguarded. Thus, it is not possible to discern the extent to which Agency safeguarding efforts may have altered in intensity regarding small research facilities and larger commercial facilities operating at different stages of the nuclear fuel cycle.

3) The transmittal of reports regarding nuclear facilities and

TABLE 20

IAEA INSPECTION IN JAPAN

Year	Number of Inspections	Man-days	Total Facilities	Total Facilities/ Man-days	Number of Inspections/ Total Facilities
1965	2	14	7	0.500	0.286
1966	2	6	6	1.000	0.333
1967	3	20	12	0.600	0.250
1968	5	27	15	0.556	0.333
1969	6	84	34	0.405	0.176
1970	6	246	77	0.313	0.078
1971	9	324	147	0.454	0.061
1972	12	274	141	0.515	0.085
1973 (estimated)	12	292	145	0.497	0.082

TABLE 21

INTERACTION BETWEEN THE IAEA AND JAPANESE ORGANIZATIONS REGARDING SAFEGUARDS

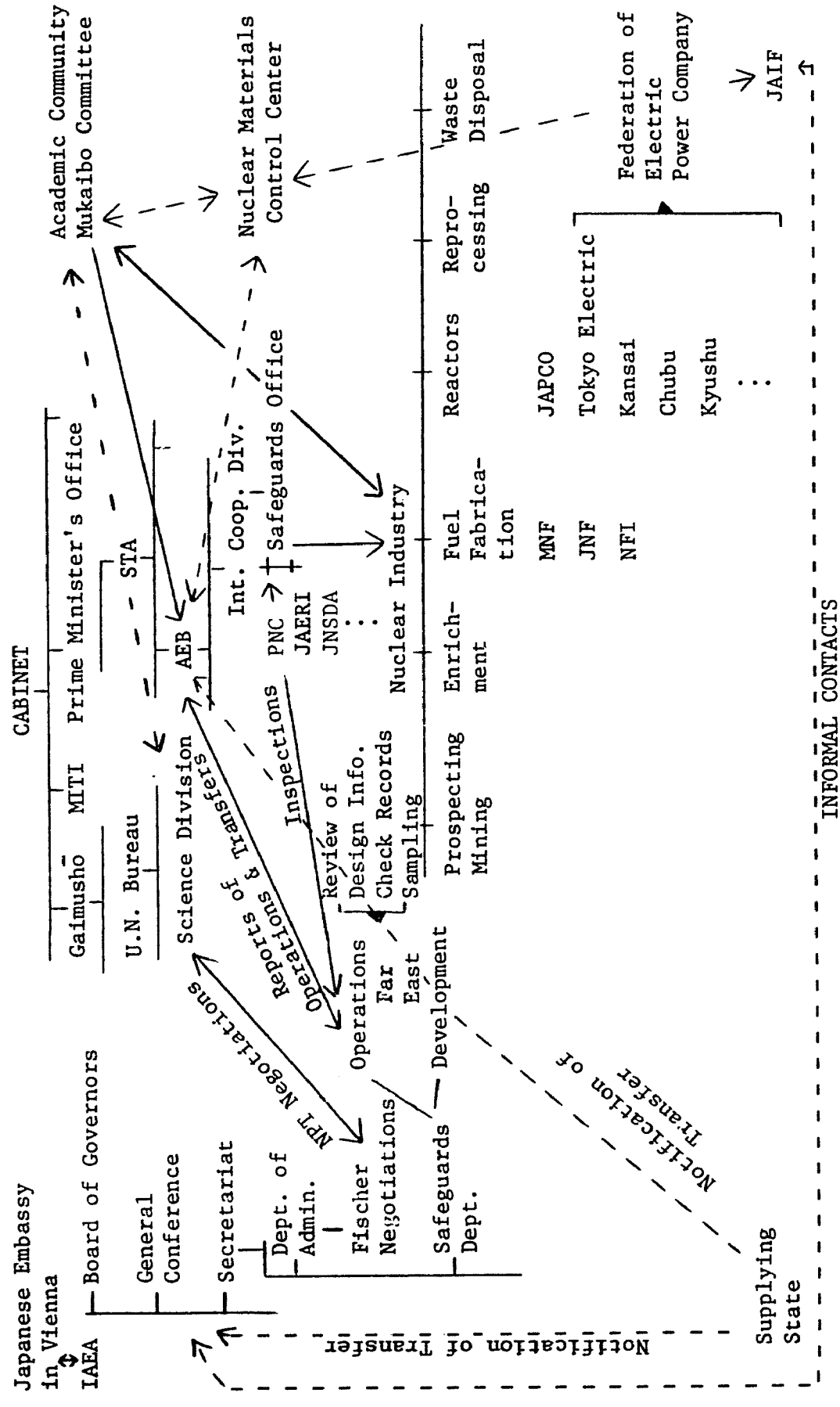
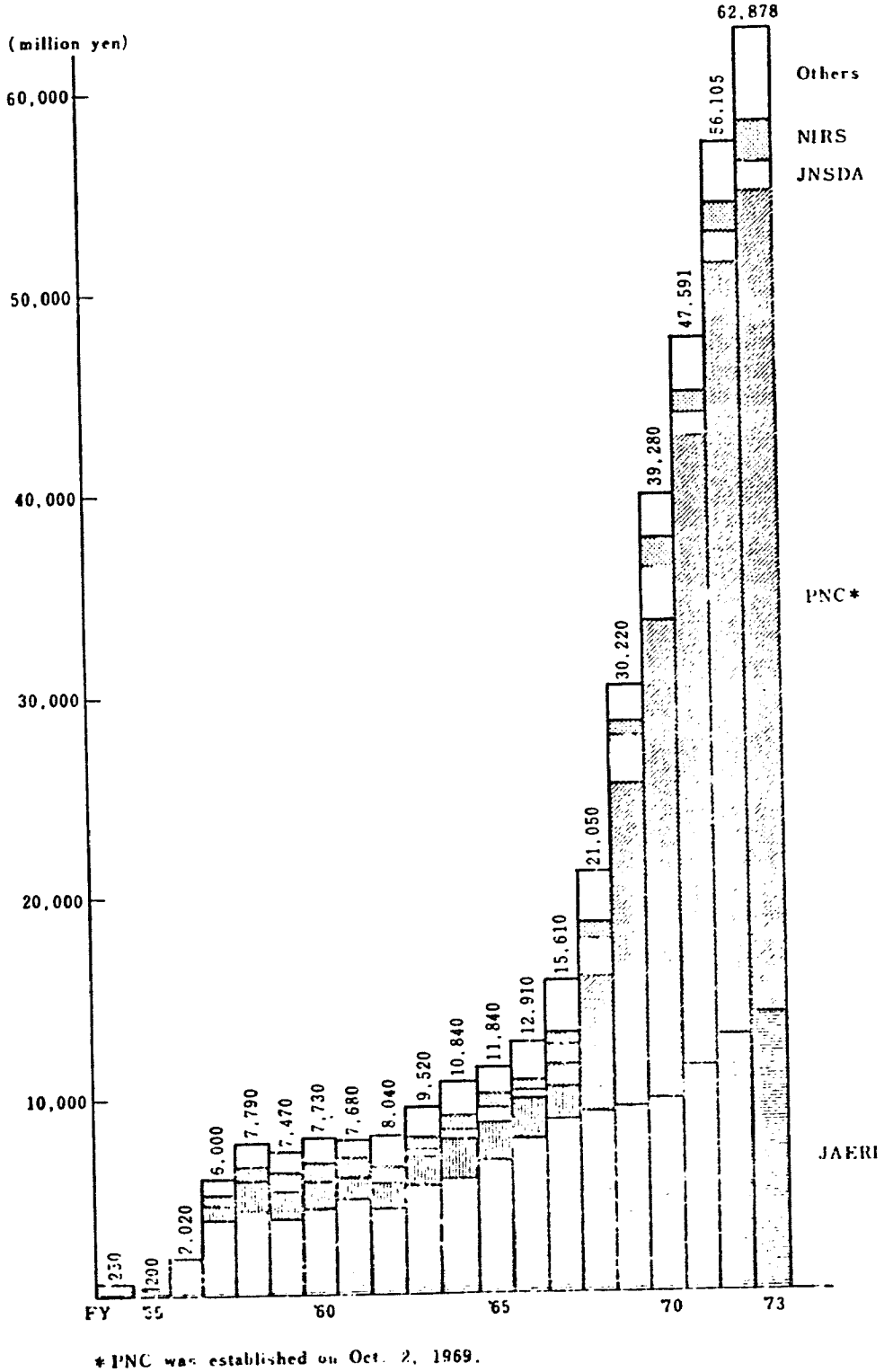


TABLE 22

Chart Year Growth of Japan's Nuclear Budget



* PNC was established on Oct. 2, 1969.

Source: "Atomic Energy Budget for Fiscal 1973," Atoms in Japan 17 (February 1973): 19.

nuclear material to the IAEA. The Atomic Energy Bureau (AEB) compiles monthly reports regarding the operations of the large nuclear facilities in Japan and semi-annual reports for the small facilities: the larger facilities included nine power reactors, six conversion plants, twenty-three research reactors and nineteen research and development facilities, while smaller facilities numbered forty-nine (for research and development) in early 1974. (The total of one hundred and six was expected to increase to one hundred and thirteen by the end of 1974 with the addition of four power reactors, two research reactors, and the reprocessing plant constructed by Power Reactor and Nuclear Fuel Development Corporation. The discrepancy between the total number of facilities noted here and the figures shown in Table 20 results from both variance in estimates and from the nature of the reporting system regarding small reactors utilized by the AEB.) According to IAEA personnel, these reports frequently arrive between six weeks and five months late. Reports to the IAEA also include notification of transfer of nuclear material and notification of receipt of nuclear material from any one of the five supplier states--the United States, Great Britain, Canada, France and Australia--with which Japan has a trilateral agreement. Table 21 provides a rough depiction of the current nature of the on-going interaction between the IAEA and Japanese organizations. All of these various types of interaction reflect reliance on underlying established organizational routines, and at both the international and national organizational level involve lower-level professional and secretarial staff. Executive personnel involvement with the routine aspects of interaction

appears minimal.

By the late 1960s several factors prompted a number of Japanese to devote serious attention to a reappraisal of the increasing interaction between themselves and the IAEA. With the expanding interest of an increasing number of Japanese organizations in various stages of the nuclear fuel cycle, it was becoming apparent that the Japanese nuclear industry was slowly assuming significant proportions and that continued growth of this industry was both likely, and from the vantage point of industry and government alike, desirable (see for example Table 22). Anxious to exploit both the energy-generating potential of nuclear energy as well as the international market for nuclear facilities and equipment, Japanese nuclear industrialists became increasingly sensitive to the economic demands and constraints attendant upon nuclear development, and increasingly anxious to guarantee the competitive quality of their domestic industry in the realm of international trade. Among the various limitations and obstacles perceived by industrialists as threatening to the future well-being of Japan's nuclear industry one of the most salient was alleged to be the continued application of international safeguards--as least as they were then being applied. By 1970, the implementation of the NPT and the convening of the Safeguards Committee meetings by the IAEA in Vienna provided both the catalyst and the opportunity for the detailed expression of Japanese reservations regarding safeguards.

The reservations expressed by the Japanese regarding safeguards policy can be divided into two general categories--those concerning safeguards policy per se and those regarding safeguards connected

with the NPT. Most of the reservations regarding the nature of safeguards per se are based on economic arguments and logic; those relating to safeguards under the NPT however, in part reflect and in part conceal basic Japanese concerns regarding the nature of the NPT itself.

Many of the reservations expressed by the Japanese concerning the continued application of international safeguards per se centered around Japanese concern for protecting their nuclear industry and insuring its continued growth. Having witnessed first-hand the gradual but steady extension of Agency safeguards from one Japanese nuclear facility to another, Japanese industrialists expressed the fear that the future growth of their domestic industry would be accompanied by the arrival of an increasing array of Agency inspectors demanding continued free access to nuclear facilities and requiring increasing tons of reports and paperwork. More alarming than the contemplation of an ever-growing volume of paperwork necessitated by this envisioned expansion of international safeguards however, was the spectre of an ever-increasing number of inspections conducted by Agency personnel. The fear that such an increase in the number of Agency inspections by a growing number of international inspectors would interfere significantly with the smooth operation of nuclear facilities, producing costly delays and even shut-downs had a profound impact on industrial thinking regarding safeguards. This fear was reinforced by an even greater fear that an increase in the number of Agency inspectors visiting Japan and conducting a corresponding increased number of inspections could greatly enhance the potential for industrial espionage and render Japan's domestic

nuclear research and development extremely vulnerable to foreign competition. Consequently the demand for a more "simplified and rational system of international safeguards" based on systems analysis, statistical sampling and surveillance machinery such as closed-circuit television, rather than Agency inspections, gained growing popularity among Japan's nuclear industrial circles.

The fears and concerns of Japanese nuclear industrialists regarding international safeguards were magnified by the implementation of the Non-Proliferation Treaty. The expansion of international safeguards coverage from individual nuclear facilities to the entire flow of nuclear material within a state provided for by this Treaty was hardly an appealing prospect for Japanese industrialists already alarmed by the image of an increasingly costly and intrusive network of international safeguards blanketing their nuclear facilities. Moreover, several provisions of the Treaty seemed to promise to make a bad situation worse.

Viewed from virtually any perspective, the NPT is an inherently unequal treaty in that it forbids Non-Nuclear-Weapon States to possess a significant commodity--nuclear weapons--which Nuclear-Weapons States already possess and are permitted by the Treaty to retain. From a Japanese perspective, involvement with unequal treaties imposed by western nations is not an unfamiliar experience, and historically-minded Japanese warned of the undesirability of a repeat of Japan's experience with western treaties during the Meiji era. Even for those Japanese industrialists unconcerned with historical precedent, however, several provisions and implications of the NPT appeared particularly unpalatable, notably the provision

that Non-Nuclear Weapon States must accept international safeguards while Nuclear-Weapon States are exempt, and the potential technological advances and advantages which could accrue to Nuclear-Weapon States as a result of their military research and development programs, which are unavailable to Non-Nuclear-Weapon States as a result of their renunciation of non-peaceful involvement with nuclear energy. While Articles IV and V of the NPT were included as an attempt to dispel this fear, the unproven willingness of Nuclear-Weapon States to share technological innovations derived from military research and development with Non-Nuclear-Weapon States reinforced a feeling of lingering uneasiness among Japanese nuclear industrialists concerned with promoting the development of their industry and preserving a competitive position in international trade.

On February 3, 1970, the Japanese government signed but did not ratify the NPT. In a statement issued at the time the government clarified its position regarding the Treaty and specified the considerations which would influence its ultimate decision regarding ratification. Included in these considerations were: 1) the level of progress achieved in the disarmament negotiations among the Nuclear-Weapon States, notably the United States and the Soviet Union; 2) the definition of provisions to insure the security of the Non-Nuclear-Weapon States, and; 3) the conclusion of a satisfactory NPT safeguards agreement with the IAEA. Of these considerations, the most conspicuous was the concern expressed regarding the nature of the safeguards agreement to be concluded with the IAEA in accord with the Treaty. Approximately one-third of the

government's statement was devoted to this issue, and the views which are expressed clearly reflect both the nature of industrial concerns and the effectiveness with which these concerns had been articulated to the government. Moreover, these views have remained fundamentally unaltered since their delineation in 1970 and represent the basis upon which Japan has engaged in discussion and negotiation with the IAEA regarding NPT safeguards since that time.

According to the government's statement, a number of variables must be considered to effect a safeguards agreement between Japan and the IAEA in accord with the NPT:

> 1. The safeguards agreement to be concluded by Japan with the International Atomic Energy Agency in accordance with Article III of the Treaty must not be such as would subject her to disadvantageous treatment as compared with the safeguards agreements which other States Parties conclude with the same Agency, either individually or together with other States. The Government of Japan intends to give full consideration to this matter before taking steps to ratify the Treaty.
>
> 2. The Government of Japan greatly appreciates, as a measure supplementing this Treaty, the delcarations of the Governments of the United States and the United Kingdom, which are both nuclear-weapon States, that they will accept the application of safeguards of the International Atomic Energy Agency to all their nuclear activities, excluding only those directly related to their national security, and earnestly hopes that these assurances will be faithfully implemented. It also hopes most earnestly that the other nuclear-weapon States will take similar action.
>
> 3. Safeguards should be subject to the principle that they should be applied at certain strategic points of the nuclear fuel cycle, and the procedure for their application must be rational when considered from the point of view of cost-effectiveness and made as simple as possible by making the maximum use of material control systems of the respective countries. Furthermore, adequate measures must be taken to ensure that the application of safeguards does not cause the leakage of industrial secrets or

> otherwise hinder industrial activities. The Government of Japan hopes that the International Atomic Energy Agency will make constant efforts to improve safeguards in the light of technological developments with the above aims in mind. This Government is prepared to cooperate in such efforts and hopes that the States concerned will also cooperate to achieve this end.
>
> 4. The Government of Japan understands that no unfair burden in connection with the cost of applying safeguards will be imposed on the non-nuclear-weapon States to which such safeguards are to be applied.
>
> 5. The Government of Japan considers that, when safeguards are applied in accordance with the safeguards agreement to be concluded by Japan with the International Atomic Energy Agency under Article III of this Treaty, steps should be taken to arrange that such safeguards supersede the existing safeguards which are being applied in connection with Japan's cooperation with the United States, the United Kingdom, and Canada in the peaceful use of nuclear energy.
>
> 6. Concrete measures should be taken to promote the implementation of the provisions of Articles IV and V of the Treaty relating to international cooperation for the peaceful use of nuclear energy and for the peaceful application of nuclear explosions. In particular, no peaceful nuclear activities in non-nuclear-weapon States shall be prohibited or restricted, nor shall the transfer of information, nuclear materials, equipment, or other material relating to the peaceful use of nuclear energy be denied to non-nuclear-weapon States, merely on the grounds that such activities or transfers could be used also for the manufacture of nuclear weapons or other nuclear explosive devices.[5]

As the above statements suggest, by the end of the 1960s the nature of the problems associated with the implementation of international safeguards by the IAEA in Japan had become sufficiently clear to prompt both an articulation of grievances by members of the nuclear industry to the government and a decision to search

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[5] Statement of the Government of Japan on the Occasion of the Signing of the Treaty on the Non-Proliferation of Nuclear Weapons, Official Translation, Tokyo, February 3, 1970, pp. 5-7.

for viable alternatives to eliminate or ameliorate these problems.

The emphasis placed by the Japanese government on the need to refine existing safeguards procedures and improve the implementation of this policy by the Agency can be regarded as an indication of the importance placed by the government on mollifying the grievances of Japan's nuclear industry as well as the importance attached to continued international cooperation in the nuclear realm based on the reaffirmation of Japan's peaceful intentions in this area. On the other hand, however, the emphasis placed by the Japanese government on the issue of safeguards under the NPT may represent an effort to divert consideration from the issues raised by the Treaty itself. Subsequent Japanese--IAEA interaction regarding international safeguards as well as the on-going discussion in Japan regarding the NPT lends a measure of credibility to this interpretation.

While a discussion of the issues and implications raised by the Non-Proliferation Treaty for Japanese domestic and foreign policy is not a primary intent of this thesis, it is nonetheless important to acknowledge that Japan's position regarding safeguards under the NPT is in part a function of the broader considerations and issues thrust upon the Japanese by this Treaty. Many of these considerations are related to the nature of Japan's ties with the United States and to the on-going ambivalent nature of Japanese defense policy; moreover, the persistence of the dilemmas posed by the NPT for the Japanese epitomize the difficulty which seems to characterize Japanese attempts to define a role for their nation in international affairs.

As noted above, on February 3, 1970, the Japanese government signed the Non-Proliferation Treaty; at the time of this writing, however, ratification of the Treaty has not been completed and Japan remains one of thirteen out of ninety-seven nations that have signed but not ratified the Treaty.[6] At first glance, the failure of the Japanese to ratify the NPT appears at least curious and somewhat perplexing. A number of consideration taken together seem to indicate that Japan would be a primary candidate for membership in the NPT club: Japan is the only nation to have suffered the horrible effects of nuclear warfare; is the only nation with a Constitution renouncing war; is a nation which has consistently denounced nuclear testing by the Nuclear-Weapon States and urged deceleration of the arms race, while reaffirming the peaceful principles underlying its own involvement with nuclear energy, and; is a major ally of one of the primary authors and promotors of the NPT. Despite these considerations, however, and despite the constant affirmation of support for the principle of non-proliferation expressed by the Japanese government, a number of other factors have eroded the appeal of participation in the NPT and leave ultimate Japanese ratification of the Treaty in serious question. Among these factors, perhaps the most notable include:

1) The potential technological and commercial disadvantages which could result from the failure of Nuclear-Weapon States to share technological innovations which have commercial application that

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[6] "NPT Delegation Members Named," The Japan Times, April 22, 1975.

are derived from military research and development. This argument regarding the so-called "spin-off" advantage of military research and development was noted above and has been a primary concern of Non-Nuclear-Weapon States contemplating NPT membership. (It should be noted that as nuclear development has progressed in Non-Nuclear Weapon States, this fear has diminished considerably.)
2) The increasingly articulated sentiment that as the third largest economic power in the world Japan has a responsibility to assume a greater role in regional if not international interaction, and to provide economic aid and leadership for the nations of East and Southeast Asia. With the United States statement of the "Nixon Doctrine" and the withdrawal of United States forces from Vietnam, this sentiment has been increasingly aired in a variety of Japanese governmental, industrial and academic circles. Many members of these circles argue that Japan cannot expect to develop any viable political leadership role if the nation is tied to an inherently unequal treaty foisted upon it at the insistence of the superpowers.
3) In addition to the sentiment noted above is the growing belief that Japan has the potential to serve in a leadership capacity among the Non-Nuclear-Weapon States and to provide a major channel through which the interests and views of the Non-Nuclear-Weapon States can be expressed to the Nuclear-Weapon States. The extent to which membership in the circle of Non-Nuclear-Weapon States signatories of the NPT would reinforce this potential is a matter of serious debate among concerned Japanese; among the objections raised to NPT ratification is the assertion that acceptance of this unequal treaty at the insistence of the superpowers signifies

weakness and thus is inconsistent with the quality of leadership.

4) Of all factors inhibiting Japanese ratification of the NPT the most serious is the question of future Japanese national security and the ultimate development and possession of nuclear weapons. The issue of continued reliance on security treaties with the United States and on the United States nuclear umbrella as the basis for national security has long been a source of heated--occasionally violent--debate in Japan. The so-called "nuclear allergy" of the Japanese and the profound anti-war sentiment which pervaded much of Japanese society in the 1950s and 1960s remains a potent force today, at least in the eyes of many Japanese politicians. Until recently the belief prevailed that open discussion of military and defense issues was unpopular at best and would be costly in terms of voter support; consequently, public discussion and debate of these issues has generally been muted. Whether the recent emergence of an influential radical right wing group--the Seirankai or "purifying wind"--within the ruling Liberal Democratic Party which is urging autonomy for Japanese defense policy and retention of the option to develop nuclear weapons, and the intensifying debate regarding national security and the future possession of nuclear weapons currently occupying Japanese political circles in conjunction with the debate regarding NPT ratification, signal a more open approach to the discussion of defense issues remains to be seen. It does seem clear however, that Japanese emphasis on the issue of safeguards under the NPT has provided a convenient means of continuing to circumvent consideration of major underlying issues regarding defense and national security, for much of the

past discussion and debate in Japan regarding the NPT has focused on the issue of safeguards rather than on these deeper, more controversial issues.[7]

While the issue of NPT safeguards has undoubtedly provided the Japanese government with a means of avoiding confrontation with major issues relating to national security raised by contemplation of NPT ratification, there can be little doubt that the objections and reservations regarding safeguards expressed by the Japanese were neither contrived nor perceived as insignificant. Manifestation of Japanese concern with the problem of NPT safeguards has been expressed in a number of ways, one of the most notable of which was the consistency and intensity of Japanese involvement in the proceedings of the Safeguards Committee which convened in Vienna in the spring of 1970. In the paper submitted at the request of the Agency expressing its "views on the implications of the Treaty on the Non-Proliferation of Nuclear Weapons for the Agency's activities in relation to safeguards, and in particular on the content of the agreements which will be required in connection with the Treaty," the Japanese government reiterated many of the views which had been expressed in the Statement issued at the time of its signing of the NPT:

> "The Japanese Government has the honour to submit . . . its view that the safeguards agreements to be concluded by the Agency in connection with Article III of the Treaty on the Non-Prolifera-

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[7]See Daniel I. Okimoto, "Japan's Non-Nuclear Policy: The Problem of the NPT," Asian Survey 15 (April 1975); 313-327, for a detailed discussion of Japan's position regarding the NPT.

tion of Nuclear Weapons (NPT) should be based on the principles enunciated and elaborated below. The Japanese Government reserves the right to submit further views at a later stage . . .

"1. The safeguards to be applied in connection with Article III of the NPT shall be solely for the purpose of preventing diversion at a national level of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices, with the understanding that the primary responsibility of preventing diversion at sub-national level rests with the parties.

"2. The safeguards, while requiring effectiveness in preventing diversion, must also comply with the principle set forth in Article III, paragraph 3 of the Treaty, namely that the safeguards 'shall be implemented in a manner designed to avoid hampering the economic or technological development of the parties or international co-operation in the field of peaceful uses of nuclear energy. These two requirements need to be equally fulfilled in concluding and implementing safeguards agreements.

"3. The safeguards under these agreements shall reflect, for the purpose of simplification, the technical developments pertaining to the principles of safeguarding effectively the flow of nuclear materials by the use of instruments and other techniques at certain strategic points. Such technical developments will be derived particularly from the use of the systems analysis on the basis of cost-effectiveness with respect to the flow of source and special fissionable materials which are under safeguards and are within a State or group of States.

"4. In order to fulfil (sic) the obligation under Article II of the Treaty, a State or a group of States shall maintain an effective system for the control of all nuclear materials in its peaceful nuclear activities.

"5. The Agency's safeguards shall be applied in such a manner as to verify the implementation of the control of nuclear materials by the State or the group of States referred to in paragraph 4 above. The verification by the Agency shall include, inter alia, the independent measurements which shall be conducted as necessary by the inspectors of the Agency at such points and locations as are to be agreed on beforehand.

"6. The mode and intensity of verification by the Agency, referred to in paragraph 5 above, shall correspond to such factors as the degree of effectiveness of the nuclear materials control system of a

State or group of States.

"7. The Agency shall, in connection with the implementation of its safeguards, take every precaution to protect commercial or industrial secrets or any other confidential information. This shall be taken fully into account in reaching agreement on the points and locations where the inspectors of the Agency may usually be permitted access. Full consideration shall be given to ensure the strict implementation, even after the inspectors shall have retired from the Agency's service, of the provisions of Article VII of its Statute which reads in part that 'they shall not disclose any industrial secret or other confidential information coming to their knowledge by reason of their official duties for the Agency.

"8. The principle shall be maintained that the expenses necessary for the Agency's application of safeguards to the Agency's Member States shall be borne fairly by all the Member States of the Agency in accordance with the provision of Article XIV.B.1 (b) of its Statute.

"9. Safeguards agreements shall provide for the principles set out in paragraphs 1 to 7 above and other common factors which shall be applicable to every State and group of States. Annexes and subsidiary agreements shall provide for the details of safeguards, including the mode and intensity of verification by the Agency. In order to reflect the results of development of safeguards techniques and to comply with the principle in paragraph 6 above, these provisions shall be flexible enough and shall be reviewed from time to time."[8]

Throughout the course of the Committee meetings, Japanese delegates sought continuously to clarify their views regarding safeguards to other Committee members and to enlist support for these views. Among the various specific proposals put forward or jointly sponsored by the Japanese, the most significant was their proposal for the establishment of national systems for nuclear material accounting and control, which would provide the future basis for

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[8]"The Views of Member States," IAEA document GOV/COM, 22/2, 15 May 1970, pp. 16-18.

Agency application of safeguards. Rather than continue the past practice of direct contact between the Agency and the safeguarded nuclear facility, the establishment of national systems for nuclear material accounting would enable the Agency to work through these systems and verify their records and accounts. Thus, it was argued, the Agency would be able to maintain a high standard of surveillance without an enormous corresponding increase in the number of Agency personnel, particularly inspectors, required. Moreover, application of international safeguards through the auspices of a national center of nuclear material accounting and control would enable the Agency to minimize the disruptive intrusive aspects of this application, and virtually eliminate the possibility of friction between Agency personnel and national operators.

As the deliberations of the Safeguards Committee progressed throughout the autumn of 1970, an event occurred which helped to underscore the validity of the Japanese reservations regarding the disruptive intrusive aspects of non-NPT safeguards implementation. In October, IAEA inspections at the Tsuruga Power Plant, Japan's first commercial boiling water reactor, operated by the Japan Atomic Power Company (JAPCO), intensified in conjunction with the first maintenance shut-down of this facility. These inspections became increasingly frequent as the days passed and included a number of "surprise" visits by Agency inspectors at various times of the day and night. Japanese patience with these unscheduled inspections rapidly wore thin, and at the end of the month senior executives of Japan's electric power industry lodged a strong protest with the Foreign Ministry, MITI and the STA. The Japanese

press provided ample coverage of the situation, fueling the Japanese feeling of indignation.[9] Ample coverage was also provided in the publications of the Japan Atomic Industrial Forum, and an article which appeared in the English-language journal of the Forum clearly reflects the prevailing Japanese feeling of exasperation with the Agency:

> Several times a day IAEA inspectors appear at the main gate of the Tsuruga Nuclear Power Station and announce their presence. Officials of the Japanese Government emerge from their office and accompany them to the checkpoint. A member of the operating crew is called on to take them to the main control room, where an industrial TV screen is available for scanning various works going on, on the reactor operating floor. IAEA inspectors watch the TV screen thoughtfully and then disappear. The government officials retreat to their office, and the inspectors drive back along the scenic peninsula road to Tsuruga City, half an hour away from the station.
>
> This ritual is repeated day after day, and supposedly will be until the end of the maintenance shutdown period of some fifty days. Since inspection is a surprise affair, nobody but the inspectors can schedule for the ritual. The Government decided to send resident officials to the station and inspection takes place at all sorts of time; sometimes, at two o'clock in the morning while everybody is sleepy, or five-thirty in the afternoon when the main control room is full of maintenance men working on reactor instrument cables. Only those with experiences of power reactor operation can appreciate how much bother these all are.
>
> What purpose this serves is very hard to understand. Nobody, including the Government officials or possibly IAEA inspectors themselves, seems to be able to find a satisfactory answer to this question. The International Atomic Energy Agency had replied to the Japanese Government that they wanted to make sure that

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[9] See, for example, "Too Strict International Inspection: Industry Circles Make Representation of Protest; Surprise Inspection Two-Four Times a Day - Tsuruga Atomic Power Generation Station," Mainichi, DSJP, November 1, 1970, pp. 39-40, and "Establishment of Nuclear Fuel Inspection Techniques Demanded," Mainichi, DSJP, November 5, 1970, pp. 9-10.

Tsuruga plant would not start up with some dummy fuel assemblies in the core, while a couple of irradiated assemblies are smuggled to a secret chemical reprocessing plant. Only those who know power reactors theoretically but not practically something to read about at a desk, can let imagination fly to such a height. But, apart from this point, there must be some other more efficent way of satisfying IAEA's curiosity, without having to waste the time of so many people and their good will . . .

If the Agency wanted to check the number of fuel assemblies removed from the core, inspectors can visit the cooling pond and see that it is empty before removal of the pressure vessel head. They can then revisit it at the time of the closing of RPV and count irradiated fuel assemblies in the cooling pond, with the aid of an under-water radiation counter if need be. They may also want to supplement this by counting fuel assemblies in the core. These, and the counting of spare fuel assemblies should more than complete the item of accountability. Why then every three hours, and a total of 200 visits?

The answer to this question was the hypothesis of smuggled irradiated fuel, which certainly demonstrates that there is no lack of imagination within the Agency Secretariat, but possible lack of appreciation of problems in practical plant operation. It is really difficult to talk to and convince people who find pleasure in playing logics. One has to be a power reactor operator to appreciate operator problems. JAPC tried to explain that there are only two entrances to the reactor building and that dimensionally the equipment air lock is the only possible route for twelve foot fuel rods to walk out of the reactor, even if someone thought of carrying irradiated fuel without shielding.

Since the air-lock is usually closed during the shutdown period and opened only occasionally, and since it takes something like six hours to open and bolted (sic) double door it may be an idea to place a temporary seal on it, and let the inspector visit it on notice of seal breaking. But even that is not really necessary because it is a well known fact that Japan does not have a chemical reprocessing plant, nor even a licensed cask in which to transport spent fuel. To this, the highly complementary remark came back that Japan with her industrial capability, could build such secretly at any minute.

Obviously, if someone were so determined to divert nuclear materials, he would build spent fuel casks secretly, or even dig a hole through the concrete wall of the reactor building, or, in real desperation,

> might even carry off several million curie-irradiated fuel assemblies without a shield. If one does not consider what is and what is not realistic, or if one defines safeguards as a cops and robbers game, to argue against such a determined stretch of the imagination merely increases, the sense of frustration. In any event, IAEA could not change its original position except to say that inspectors can watch by the TV screen, (which is also in the control area) but that they will continue to do so even after the vessel head is on. They say they are reserving the right to visit the operating floor at any time. Neither the Japanese Government nor JAPC could accept this position, but has stopped short of physically preventing the Agency inspectors from carrying out their instructions.[10]

The origins of this direct clash between the IAEA and the Japanese regarding safeguards are obscure. The Japanese profess total ignorance regarding the motivations behind the Agency's actions. In Vienna, no explanation or justification for the intensity of Agency inspections in this instance was issued. According to the Agency's Inspector General, despite the flood of opinions and comments evoked from around the world by this incident, the Agency could not jeopardize its impartiality as an international organization by issuing any policy position or statement. Unofficially, however, mutterings were heard from various corners of the Agency regarding the timing of the incident, and the feeling was not uncommonly expressed that the entire affair had been staged by the Japanese to influence the deliberations of the Safeguards Committee and to underscore their insistence that safeguards procedures be simplified.

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[10]"Experience in International Inspection," Atoms in Japan 14 (October 1970): 8, 10.

While this unofficial interpretation of the events at Tsuruga has at least the appearance of plausibility, it is interesting to note that this view does not explain how the Japanese were able to elicit the intensification of Agency inspection efforts to produce a confrontation. Moreover, it is interesting to speculate that the actions of Agency inspectors at Tsuruga may have resulted in part from the absence of established organizational routines for conducting these inspections. While the format for inspection was formally defined, the lack of experience in conducting actual inspections during this first maintenance shut-down at Tsuruga may have enhanced Agency staff uncertainty, which in turn may have reinforced a tendency to discharge safeguard responsibilities strictly in accordance with formal written guidelines. Thus, within the broad parameters of IAEA—Japanese routine interaction regarding safeguards, the Tsuruga incident may be regarded as one manifestation of the need for established operating routines to facilitate international organizational activity in a national organizational context.

The extent to which the events at Tsuruga had any determining influence on the final recommendations of the IAEA's Safeguards Committee is unclear. Whether in spite of or because of this incident however, the Japanese gained sufficient support among Committee delegates to win final approval for inclusion of Article 7 in the safeguards system ultimately resulting from Committee labors. Of the various provisions included in this system, it appears that Article 7 is unquestionably among the most important, for this Article appears to have significant implications for the future

of the IAEA's involvement with safeguards implementation. According to this Article:

> 7. The agreement should provide that the State shall establish and maintain a system of accounting for and control of all nuclear material subject to safeguards under the Agreement, and that such safeguards shall be applied in such a manner as to enable the Agency to verfiy, in ascertaining that there has been no diversion of nuclear material from peaceful uses to nuclear weapons or other nuclear explosive devices, findings of the State's system. The Agency's verification shall include, inter alia, independent measurements and observations conducted by the Agency in accordance with the procedures specified in Part II below. The Agency, in its verification, shall take due account of the technical effectiveness of the State's system.[11]

Of the considerations raised by this Article, the most fundamental is the nature of the role to be assumed by the IAEA vis-a-vis the national system of nuclear material accounting established by each state accepting international safeguards under the NPT.

In Japan, the inclusion of Article 7 in the Model Agreement for safeguards under the NPT was hailed as an achievement of Japanese diplomacy, and was envisioned in both industrial and government circles as a significant means of minimizing the objectionable aspects of safeguards implementation. Virtually all of those interviewed in Tokyo for this study expressed the belief that Article 7 would provide the basis for minimizing the safeguarding responsibilities of the IAEA in Japan and for reducing the number of inspections conducted by the Agency. As one official noted,

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[11] The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, IAEA document INFCIRC/153, May, 1971, p. 3.

according to Article 7, the "IAEA should not directly control the (safeguards) system in Japan but check it as a mediator." One of the primary architects of the Japanese position regarding safeguards, Imai Ryukichi, has observed,

> Opinions vary from country to country as to the role of a national safeguards system . . . The problem here is whether or not verification conducted by the national or regional system will reduce the intensity of IAEA verification activities. It is my contention that it will, and that if this is so, it will greatly reduce the work involved in the Agency's safeguards system.[12]

In Vienna, a more cautious approach to the interpretation of Article 7 prevailed. One Agency executive stated with guarded optimism that a national system of nuclear material accountability "can be but is not necessarily of service to the IAEA." Another executive asserted that he did not know what effect a national system would have on Agency safeguard efforts, for the Agency had only limited experience with national systems and therefore little basis for evaluation. Indeed, at this time, assessment of the potential impact of national systems of nuclear material accountability on the Agency's safeguards function appears problematic, at best. On the one hand, national systems provide a mechanism for the gathering of the detailed data required for safeguards

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[12]Ryukichi Imai, Nuclear Safeguards, Adelphi Papers, no. 86 (London, The International Institute for Strategic Studies, 1972), p. 14. For a more extensive analysis of the role of the national safeguards system and the issues raised by these systems for the IAEA see Ryukichi Imai, "Nuclear Non-Proliferation Treaty --Japanese Attitude Three Years After Signature," Review of Nuclear Proliferation Problems SIPRI Symposium, Tällberg, Sweden, 15-18 June, 1973, pp. 13-14.

implementation. Moreover, these systems can provide a practical means of extending Agency safeguards without necessitating an exponential increase in Agency inspectors and supporting staff. On the other hand, however, these systems are interposed between the Agency and the national facilities being safeguarded, and may render these facilities less accessible to international safeguards. Moreover, if the Agency is forced to rely solely on the data collected by these national systems, it will be left with no means of independent verification of this data. While intensive efforts were made to insure perpetuation of the Agency's right of independent verification of national data, and this right is carefully preserved in the text of Article 7, it is not difficult to envision disparity between the formal enunciation of this right and its practical application. As one participant in the Safeguards Committee meetings noted, a key issue raised by Article 7 is the need to distinguish between Agency verification of the adequacy of a national system structure as opposed to verification of the findings of the national system. Based on this distinction, the central issue of safeguards application under the NPT is "whether the IAEA will conduct an audit of the various national systems or whether it will verify the results and findings of the national system." If the Agency is to verify the findings of national systems, steps must be taken to insure that the data it gathers is "functionally independent" of the data gathered by nuclear facility operators and by the staff of a national accounting organization. The independence of the data sets gathered by facility operators, national systems personnel and the Agency staff respectively is a function of the sampling and

statistical techniques utilized to gather and analyze these data and to date, the technical procedures and mechanisms needed to insure the independence of separate data sets are not fully developed. Hence, refinement of the technology associated with nuclear material sampling and accounting needed to provide a basis for independent sampling and data gathering by facility operators, national officials and Agency personnel is now a major concern of those involved with safeguards at both the national and international levels.

Since the termination of the Safeguards Committee meetings in 1971, Japanese and IAEA officials have been engaged with varying degrees of intensity in an on-going effort to arrive at an agreement regarding the application of safeguards under the NPT in Japan. Negotiations regarding this agreement were held between the two sides in June, 1972, June, 1973, September, 1973 and November, 1973, and were defined as "preliminary" by the Japanese, to avoid the impression that these talks signaled impending Japanese ratification of the NPT. These negotiations can be regarded as an attempt by the organizations involved to define new procedures on which to base future interaction: moreover, unlike the routines, discussed above, which have been established to facilitate interaction regarding non-NPT safeguards which involve lower level professional staff at both the international organizational and national organizational level, these negotiations have been conducted by upper level executives on both sides. The many delays which have characterized these negotiations appear to stem from two major sources, namely, issues related to the implementation of NPT safeguards in Japan and considerations resulting from the nature of the Japanese

organizations involved with safeguards policy.

Of the various sources of delay in IAEA-Japanese negotiations relating to NPT safeguards implementation in Japan, one of the most salient has been the Japanese determination to await the outcome of concurrent negotiations being held between the IAEA and the members of EURATOM regarding NPT safeguards. Japanese concern with the outcome of these negotiations, which commenced in November, 1971, stems from their overriding concern to insure the competitive quality of their nuclear industry and avoid, as far as possible, any form of interference with the operations of this industry. Japanese officials estimate that in the foreseeable future the dimensions of the nuclear industry in the United States, EURATOM and Japan will be approximately equal; the Japanese have no intention of jeopardizing the future capacity of their industry to compete with that of the United States and EURATOM by accepting more extensive international safeguards than those applied by the IAEA to EURATOM. Accordingly, the Japanese have asserted that the safeguards agreement to be negotiated with the IAEA in conjunction with the NPT "either individually or together with other States"[13] must be substantially equal for all states; all states must be accorded equal treatment in the application of NPT safeguards, whether their association with safeguards results from a direct agreement with the IAEA or from involvement in a multi-state grouping, notably, EURATOM. Moreover

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[13] Treaty on the Non-Proliferation of Nuclear Weapons, Article III.4, as cited in Mason Willrich, ed., International Safeguards and Nuclear Industry (Baltimore, The Johns Hopkins Press, 1973), Appendix A, p. 257.

all nuclear material accounting systems--whether the produce of multi-state cooperation or the result of action on the part of a single state--must be regarded as equal by the IAEA and treated accordingly.

Given the presence of an established system of safeguards operative in the EURATOM system as opposed to the absence of any defined national nuclear material accounting system in Japan, the Japanese demand for safeguards application and utilization of a national accounting system by the IAEA substantially equal to that of EURATOM, has met with something less than profound enthusiasm on the part of the EURATOM nations as well as in Vienna. (The Japanese do have a system for monitoring the design and operation of nuclear facilities to insure the safe handling and use of nuclear material, but this system is not a large one.) On the other hand, however, the dimensions of IAEA involvement with non-NPT safeguards in Japan, together with the possibility of EURATOM superceding the IAEA in applying safeguards to its nuclear facilities, and the renunciation by the United States of any safeguards rights concerning the nuclear material it supplies to EURATOM, while at the same time reserving these rights vis-a-vis the material it supplies to Japan should the IAEA for some reason be unable to fulfill its safeguards obligations under the trilateral agreement, all combined to reinforce a feeling of vulnerability to external intervention and interference on the part of the Japanese and renders their insistence for equality increasingly comprehensible.

Given their concern with the provisions of the NPT safeguards agreement concluded between the EURATOM nations and the IAEA, particularly those of the accompanying Protocol wherein the

safeguards systems of EURATOM and the Agency are reconciled, it is not surprising that the Japanese delayed their own negotiations regarding NPT safeguards with the Agency until the conclusion of the EURATOM-IAEA agreement. This agreement was signed in Brussels on 5 April 1973, and was hailed by the head of the IAEA negotiating team as "the most important agreement yet concluded for implementing the safeguards provision of the NPT . . ."[14] In Japan, the conclusion of this agreement provided the impetus for the resumption of "preliminary negotiations" with the Agency regarding NPT safeguards; accordingly, Foreign Ministry Councillor Sugihara Shinichi, AEB's International Cooperation Division Director Shibata and Foreign Ministry Adviser Imai Ryukichi (Deputy Manager, Technical Division, JAPCO) were sent from Tokyo on June 6 for three days of discussion with an IAEA negotiating team, headed by David A. V. Fischer, who had also headed the Agency negotiating team dealing with EURATOM. In these discussions as well as in subsequent sessions, the Japanese have reiterated their view that all NPT safeguards agreements negotiated on the basis of the Model Agreement should be regarded as equal by the IAEA, and that all non-Agency nuclear material accounting systems, whether devised by one state or a group of states, must be treated as equal.[15]

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[14]David A. V. Fischer, "IAEA/EURATOM Agreement--An Explanation," IAEA Bulletin 15, no. 3 (June 1973): 10-16.

[15]See, "Foreign Ministry Councillor Sugihara Interviewed on Safe-Negotiations," JAIF Weekly, June 21, 1973, Atomic Energy Commission, American Embassy, Tokyo (AEC, AM-EMB) unofficial translation, June 27, 1973; "Holding Safeguards Panel Discussions in Tokyo," Denki Shimbin, November 8, 1973, AEC, AM-EMB unofficial translation, November 8, 1973; Tsutsumi Yoshinobu, "IAEA Inspector-General Rometsch Interviewed," Nihon Keizai, November 7, 1973, AEC, AM-EMB unofficial translation, November 8, 1973.

In a brief announcement on November 16, 1973, the Japanese Foreign Ministry and the Science and Technology Agency announced that an understanding had been reached with the IAEA regarding NPT safeguards as a result of "preliminary negotiations." According to this announcement, "this agreed-upon item has approved 'self-inspection,' which will be implemented by the Japanese Government independently, in addition to the international inspection, which will be implemented by the IAEA directly."[16] This agreement was interpreted by the Japanese to mean that the application of NPT safeguards and the corresponding use of a Japanese nuclear material accounting system by the IAEA would be substantially equal to the approach used by the Agency for safeguarding EURATOM countries. Despite this agreement, however, no further action regarding the NPT safeguards issue was taken until January, 1975, when a Japanese negotiating team was once again sent to Vienna; after nine days of additional "preliminary negotiation,"

> Japanese Government sources disclosed its negotiating team has reached agreement on the provisions and text of the agreement with the IAEA, which would accord Japan 'most-favored-nation' treatment--the terms for Japan would be the most favorable among those granted any country or group party to similar agreements with IAEA.
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> The terms are the same as those of the 1973 agreement concluded between the IAEA and the European Atomic Energy Community (Euratom), the

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[16]"Japan Takes Step Forward Toward Ratification of Nuclear Non-Proliferation Treaty," Mainichi, DSJP, November 17, 1973, p. 30. See also, "Japan's Preliminary Negotiations with IAEA about Safeguards Under NPT Reach Basic Agreement," Denki Shimbun, November 19, 1973, AEC, AM-EMB unofficial translation, n.d.

> affiliated organization of the European Economic Community, and includes in addition the most-favored-nation clause.
>
> The Japanese government, and not the IAEA, would conduct the inspections of nuclear materials and power facilities, provided its procedures and standards met IAEA requirements, and submit reports to the agency. The frequency of inspections would be reduced as such countries as the United States, Britain and Canada, which supply nuclear fuel, equipment and technology to Japan could cut down on their checks here.[17]

With the delineation of an agreement with the IAEA regarding the application of NPT safeguards in Japan, the Japanese government has successfully fulfilled one of the preconditions defined in its 1970 Statement, upon which ultimate Japanese ratification of the NPT is based. Moreover, according to the terms of this agreement, most, if not all, of the major Japanese reservations regarding the implementation of international safeguards in Japan by the IAEA have been eliminated: with the impending increase in Japanese responsibility for inspection of domestic nuclear facilities and the guarantee by the Agency that NPT safeguards will be equally applied to all "states or groupings of states," there appears to be little basis remaining for Japanese fears regarding disadvantageous, excessive imposition of NPT safeguards by the Agency.

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[17] "Accord with IAEA Helps Open the Way for NPT Okay Here," Asahi Evening News, Tuesday, February 11, 1975. See also, "Japan, IAEA Find Accord on N-Checks," The Japan Times, Thursday, February 13, 1975; "Ratification of NPT Should Be Hastened: Atomic Industrial Forum: Judges Equality on Peaceful Uses to Have Been Secured Through Negotiations with IAEA," Asahi, DSJP, February 14, 1975, p. 41; "Japan Secures Autonomy as to Inspection Under NPT; Foreign Ministry Will Work to Persuade LDP, aiming at Early Ratification; Industrial Secrets Will Be Protected," Yomiuri, DSJP, February 16, 1975.

As we have seen, the final emergence of an NPT safeguards agreement between the IAEA and the Japanese necessitated several years of discussion and negotiation: a number of Japanese organizations were involved to varying degrees and in varying capacities in these negotiations and there are a number of indications that the final agreement negotiated with the Agency regarding NPT safeguards reflects the involvement of these organizations to a considerable degree. Moreover, it appears that the terms of this agreement could have a profound impact on the future conceptualization of international safeguards policy and the role of the IAEA regarding this policy. Thus, in an attempt to suggest the impact which Japanese organizations could have had on the Japanese interaction with the IAEA regarding the conclusion of an NPT safeguards agreement and in an attempt to discern the implications of Japanese organizational involvement in this interaction for the future of the IAEA's role regarding safeguards, let us look more closely at these organizations and their activities regarding NPT safeguards.

PART TWO

JAPANESE ORGANIZATIONAL CHARACTERISTICS AND INTERNATIONAL SAFEGUARDS

While the involvement of Japanese organizations with international safeguards and more specifically with the delineation of an NPT safeguards agreement between Japan and the IAEA has undoubtedly been influenced by a number of considerations external to these organizations, it nonetheless appears that the internal characteristics of these organizations may also have had a significant

impact in shaping the nature of the interaction which has transpired with the Agency. Thus, in this section we shall focus more closely on several of the internal attributes of these organizations--including structural considerations, decision-making techniques and involvement of organizational personnel--in an attempt to suggest the nature of this impact and its significance for safeguards implementation.

Japanese Organizational Structure and International Safeguards

Among the various structural features of the Japanese organizations involved with international safeguards which may have had an impact on IAEA efforts to implement safeguards in Japan, several seem particularly noteworthy and include: the gradual increase in the total number of organizations involved with international safeguards; the increasing complexity of organizational involvement with safeguards; the increased diversity of organizations concerned with safeguards; the maintenance of close communications among these organizations, and; the increased rivalry among the organizations concerned with the administrative aspects of international safeguards.

As was noted in Part One, the original safeguards measures applied to Japan by the IAEA in conjunction with the first transfer agreement concluded between the Agency and the Japanese in 1959 were both provisional in nature and modest in scope; moreover, only the Japanese Science and Technology Agency and one governmental research institute administered by the STA, namely the Japan Atomic Energy Research Institute (JAERI) were involved with these initial safeguards measures. As Imai has noted, "Safeguards began to be

applied to Japan . . . late in the 1950s, but such application was only prefunctory."[18] As was observed above, however, the number of Japanese organizations involved in nuclear development and the application of international safeguards to the activities of these organizations expanded concurrently during the 1960s and first half of the 1970s. Moreover, this increase in the total number of Japanese organizations affected by international safeguards was accompanied by an increase in both the complexity of Japanese organizational involvement with nuclear development and in the complexity of the safeguard procedures applied by the Agency to these organizations. Thus, as the Japanese nuclear industry expanded from initial research endeavors on the part of universities and government corporations to include planning and construction of nuclear power reactors by the electric power companies, beginning in the early 1960s, and subsequently efforts by a growing number of companies and their subsidiaries to include activity at every stage of the nuclear fuel cycle by 1970, so also did the system of international safeguards administered by the IAEA expand from its modest beginnings in 1961 to include virtually all phases of the nuclear fuel cycle by 1970. Thus within the decade following its initial delineation of provisional safeguards measures for Japan in 1959, the IAEA was involved in a growing number of increasingly complex safeguards activities applied to a growing number of diverse Japanese organizations actively involved in a variety of complex

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[18] Imai Ryukichi, "International Safeguards," November, 1972, AEC, AM-EMB unofficial translation, January 17, 1973.

endeavors related to every stage of the nuclear fuel cycle. Table 23 provides an indication of the increase in the number, complexity and diversity of Japanese organizations involved with correspondingly complex and diverse IAEA safeguards procedures.

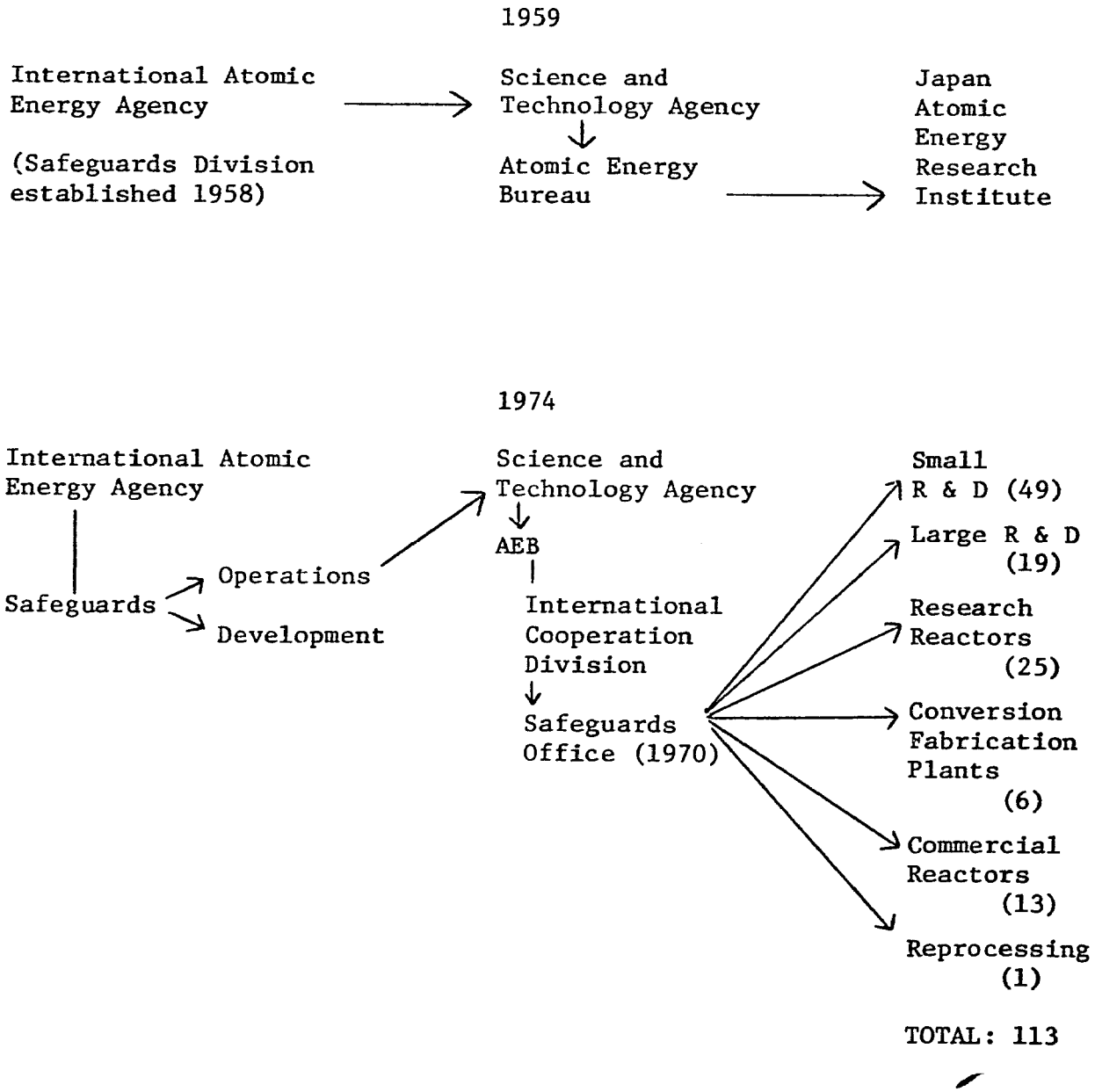
Throughout the course of the expansion of its safeguards activities in Japan, all official Agency contact and communication regarding safeguards in Japan has consistently been channeled through the Atomic Energy Bureau of the Science and Technology Agency. On Marcy 2, 1970, the International Cooperation Division of the AEB was expanded to include a modest Safeguards Office, "headed by AEB's International Cooperation Division Director Yoshio Kawashima, (and) composed of a Planning Unit for safeguards—related planning and research and a Business Unit for implementation of safeguards. In addition, the Office has 'specialist officiers.'"[19] This Office began with a small staff of five or six and has grown very little; in 1974 there were eleven members, including the head of the International Cooperation Division. While the small size and minimal growth of this office would appear on the one hand to indicate rather limited involvement on the part of the Japanese with the issue of international safeguards, the timing behind the establishment of this office may be regarded as an indication of increased concern with safeguards corresponding with the implementation of the NPT and the scheduled start of the Safeguards Committee meetings in Vienna. Moreover, to some degree the modest nature of

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[19]"STA's Safeguards Office," JAIF Weekly, March 12, 1970, AEC, AM-EMB unofficial translation, n.d.

TABLE 23

EXPANSION OF INTERNATIONAL SAFEGUARDS IN JAPAN



this office camouflages the volume of communication and interaction which transpires among the Japanese organizations involved with Agency safeguards. While much of the organizational communication which occurs in Japan regarding safeguards relates to the routine on-going implementation of safeguards procedures by the IAEA, contact regarding the more controversial aspects of this policy is not uncommon, and this type of contact offers insight into the complex organizational bargaining and rivalry which comprise a part of Japanese involvement with international safeguards.

The organizational communication regarding international safeguards which occurs in Japan can be categorized as either intra-organizational or inter-organizational: moreover, inter-organizational communication includes contacts both within and among the various subsets of organizations which comprise the total of Japanese organizations involved with Agency safeguards. As noted in Chapter III, these organizations can be grouped into three general categories: government, industrial and academic. Thus communication can be characterized as that which flows among the organizations in each of these categories or subsets of these categories, as well as between organizations in different categories.

Within the government category, as we have seen, two organizations--the Science and Technology Agency and the Foreign Ministry--play an active role regarding international safeguards. In general, the jurisdictional limits defining each organization's involvement with safeguards policy are clear: the STA is responsible for the technical aspects of safeguards implementation and is closely involved with the actual application of safeguards measures by

the IAEA, while the Foreign Ministry is responsible for the diplomatic aspects of safeguards and handles negotiations with the IAEA, notably those relating to NPT safeguards. Thus communications within and between these organizations generally relate to the respective functions of these organizations and occurs among the personnel staffing the various organizational subdivisions involved. Moreover, these communications frequently include contact with the other governmental organizations more peripherally associated with safeguards, notably the Japan Atomic Energy Commission and the Ministry of International Trade and Industry.

In addition to the routine communications flowing within and among these organizations regarding safeguards, however, less routine and more controversial contact occurs from time to time, which reflects entrenched bureaucratic interests and parochial concerns. Moreover, this contact can reflect the division which occasionally characterizes relations between Japanese politicians and bureaucrats, and highlights the vulnerability of the bureaucracy to at least temporary interference from political interests, for while civil servants staff posts below that of Minister, the head of each Ministry or Agency is a political appointee. While clashes between the government organizations involved with international safeguards were frequently mentioned in general terms during the course of interviews in Japan, a primary illustration of this type of interaction is provided by a sequence of events which occurred in late 1973 and early 1974.

In November, 1973, as we have seen, the Foreign Ministry and the STA announced substantive agreement with the IAEA regarding

implementation of NPT safeguards, thus ostensibly fulfilling one of the preconditions defined by the Japanese government as essential to ultimate Japanese ratification of the NPT. On December 11, 1973, former Prime Minister Tanaka, in replying to a question by Liberal Demócrat Hosokawa Morihiro, a member of the House of Counsellors, announced that the government was prepared to submit the NPT for ratification to the present session of the Diet. This unexpected announcement, a surprise to many politicians, was regarded as a shrewd political maneuver by Tanaka to mobilize support for this controversial legislation among the various factions of the ruling LDP at a time when the Party was preparing for the up-coming House of Counsellors election in the spring and could not affort to split over the issue of NPT ratification. The Japanese press greeted Tanaka's announcement with a virtually unprecedented expression of support: each of the major newspapers carried an editorial endorsing Japanese ratification of the NPT.[20] Support for ratification also came from Japan's nuclear industrial circles, which, in conjunction with the apparent resolution of issues relating to international safeguards implementation by the IAEA, expressed increasing concern lest the failure to ratify the NPT should cause supplying states--notably the United States--to curtail the shipment of nuclear material to Japan.[21] It should be noted here that this

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[20]See, for example, "It is All Right to Ratify Nuclear NPT," Sankei, DSJP, December 18, 1973, p. 1.

[21]See "Japan Moves Toward NPT Ratification," Atoms in Japan 17 (May 1973): 3-6. See also "Industries Welcome Government's Intention to Introduce NPT into Current Diet Session," Denki Shimbun, January 22, 1974, AEC, AM-EMB unofficial translation, January 22, 1974.

concern continues today to be a major factor reinforcing industrial support of NPT ratification. Meanwhile, in an effort to eliminate the last vestiges of the issue of safeguards as an obstacle to ratification, efforts were undertaken to promote the establishment of a national safeguards center.

The concept of a national safeguards center had become increasingly significant in the aftermath of the IAEA Safeguards Committee meetings and the incorporation of Article 7, which provides for Agency utilization of national systems of nuclear material accountability, into the Model Agreement for NPT safeguards. Moreover the establishment of a national system of nuclear material accountability became an increasingly urgent consideration as the Japanese pressed their demand for equal utilization of national and multi-national accounting systems by the IAEA, for, as the Japanese were well aware, this demand was significantly weakened by the continued absence of such a system in Japan. Thus, in an effort to lay the foundation for a substantial national safeguards center, the Nuclear Materials Control Center was inaugurated on April 15, 1972, to serve as the forerunner of this center. Under the management of Kawashima Yoshio, who had been with the STA for sixteen years and whose ability "in 'atomic energy diplomacy' received a high appraisal," the Center

> is aimed at further improving the nuclear materials control system which already exists in Japan by law (Reactor Regulations Law). Under IAEA's new safeguards system, the control systems on a country-by-country (or region-by-region) basis are going to be used full-fledgedly. This fact means that Japan's strong assertions have been accepted. However, once inspectors come to Japan, they are under such impressions that

'Japan's control setup does not seem to be systematic' and that 'a safeguards office seems to be located at a corner of the office of the International Cooperation Division, but . . .' In EURATOM or elsewhere, there are opinions that inspectors should be actively sent into Japan. It may be true that Japan is short-staffed and cannot be expected to make remarkable accomplishments, yet such a situation may lead to the criticism that 'Japan is doing nothing but lip services,' and a problem of international trust may arise. 'Then' says Kawashima, 'you probably can think that our Center has been established in order to show our attitude in a concrete form.'

With progress in the development of atomic energy, inspections under the safeguards system for prevention of diversion of nuclear materials to military uses will become increasingly frequent and severe. On the occasion of the periodic overhauling of JAPCO's Tsuruga Nuclear Power Station in October 1970, there were as many as 69 inspections, even at night, without advance notification. The cool-headed President Ipponmatsu (Board Chairman of JAPCO at present) reportedly got mad with anger, saying that the operation was affected. This is the so-called "Tsurgua case,' which is still fresh in people's memory. Is it impossible to make simpler and more reasonable such inspections which are, so to speak, embarassing to reactor installers? To work in this way is another important mission of the Center.

Kawashima says, 'This year will be devoted to drawing blueprints, and full-fledged activities will begin probably next year. As for the future, I want to see to it that inspectors will just have to take a look at data in our office and then drink on their way home.' He says that this is a target ten years ahead and this is what he is dreaming of.[22]

By December, 1973, with the satisfactory outcome of NPT safeguards negotiations with the IEAE and the Tanaka announcement regarding his intention to submit the NPT for Diet ratification, the need, as Kawashima noted at the time, for Japan to make "some kind

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[22]"Kawashima Interviewed as Managing Director of Nuclear Materials Control Center," JAIF Weekly, April 27, 1972, AEC, AM-EMB unofficial translation, May 2, 1972.

of definite action or gesture to the IAEA . . . to indicate Japan's intention to develop a national safeguards system" was overwhelmingly apparent. Consequently the Science and Technology Agency began taking action to "persuade" the Ministry of Finance to allocate funds to set up a new national safeguards center. This action followed the established procedures for submitting funding requests to the Finance Ministry, which in late December concludes its final deliberations regarding the provisions of the annual budget for the fiscal year beginning April 1. These deliberations, it should be noted, are an exhausting twenty-four-hour-a-day marathon of discussion, bargaining and negotiation on the part of officials from each government ministry who must argue the merits of their funding requests. Staff members of the Bureau of the Budget of the Finance Ministry rent beds and settle in for seven to ten days of on-going bargaining.

According to Kawashima, the STA request for funding for a national safeguards center would appear as a new item of the AEB budget. While this request would be a "small item" within the overall budget, it would nevertheless be difficult to establish this new organization owing in part to government reluctance to initiate a new governmental body with potential to expand and in part to the difficulty of obtaining staff for this new organization. This difficulty results from the fact that the number of civil servants for each government ministry is a fixed number: thus it would be difficult to "borrow" the fifty or so personnel anticipated for the new Safeguards Center from the existing staff of the AEB. Moreover, the total number of government organizations is strictly monitored

by the Administrative Control Agency which, as one JAEC executive noted, "has the bird's eye view on what the government structure should be." This Agency, located in the Office of the Prime Minister and generally headed by an important Cabinet member, controls the entire administrative structure of the Japanese government, and according to a JAEC Commissioner "presented difficulty to us in the matter of establishing a national safeguards center." This difficulty was regarded by a number of Japanese officials as an expression of the reluctance of the Administrative Control Agency to permit the establishment of an organization with the potential "to grow and expand." Moreover, this difficulty was compounded by the position assumed by the Minister of the STA regarding the establishment of a national center. According to the standard operating procedures described by one senior Japanese official, this Minister, at the time a Mr. Moriyama, must make a "strong request" to the Ministry of Finance to obtain funding for the national center. However, Moriyama, appointed to his post by Tanaka in November, 1973, during a Cabinet reshuffling following the death of a Cabinet member and a consequent need to rebalance factional interests within the Cabinet, and who was regarded by many as a right-wing "Great Hawk" in favor of retaining a free hand for Japan regarding the nuclear option, opposed NPT ratification, and ordered the staff of the STA "not to work very hard" to persuade the Finance Ministry to allocate funds for a national safeguards center. Rather, Moriyama "worked very hard" to expand the number of bureaus of the AEB and to reorganize the AEB to include an expanded Safeguards Office.

On December 28, 1973, the Ministry of Finance rejected the request for funding of a national safeguards center: as a compromise, the Ministry agreed to a reorganization of the AEB and the creation of a tokenly enlarged Safeguards Office, with a staff of twelve or thirteen. This decision brought the momentum for the creation of a national safeguards center, supported by a wide range of bureaucratic and industrial interests, to a standstill; correspondingly, the move toward NPT ratification dwindled. As was noted in the weekly newspaper of the Japan Atomic Industrial forum:

> Prime Minister Tanaka had made up his mind to introduce NPT into the present Diet session primarily because prospects have been obtained for Japan's equality with other countries (EURATOM in particular) in safeguards. However, the plan to establish a Japan Nuclear Safeguards Center as a special corporation was scrapped owing to opposition from the Administration Management Agency and others. Since establishment of a domestic setup is a condition imposed by IAEA for equality in safeguards, some Government officials concerned wonder if the present Governmental setup merely with some personnel increase will be convincing to IAEA. Some other Government officials, however, are of the opinion that IAEA attached importance to actual activities rather than the means of inspections. A Foreign Ministry source is saying that things will depend upon negotiations with IAEA after all, but is afraid that inspections may become severer.
>
> Foreign Minister Ohira in his Diet speech said that the Government will make necessary preparations for starting negotiations on a safeguards agreement under NPT, but his remarks were equivocal enough to allow the interpretation that NPT may not be introduced into the present Diet session. Furthermore, STA Director General Moriyama's intention calling for cautiousness on NPT ratification seems to be greatly influencing the question of whether or not to introduce NPT into the Diet.
>
> The Foreign Ministry, which desires early ratification of NPT, is afraid that a delay in ratification of NPT may not only affect progress in the peaceful uses of atomic energy but also make Japan isolated internationally. If things remain as they are, Japan will be unable to attend the

> the preparatory conferences for restudies of NPT to be held in February, July and September this year and the NPT restudy conference to be held in May next year. Considering that Japan strongly proposed this kind of conference, the Foreign Ministry is afraid that Japan may lose an opportunity to express its opinions.
>
> Cancellation of the plan to establish a Safeguards Center is causing a gradually increasing stir. The Foreign Ministry plans to start full-fledged negotiations with IAEA late this month, but the situation may assume a serious aspect depending upon how IAEA will look upon the change in situation in Japan.[23]

By March, 1974, it was becoming increasingly clear that NPT ratification was eminently unlikely prior to Diet adjournment in June.[24] As one Japanese official noted resignedly, "we have missed our opportunity and so must wait." Thus it appears that the convergence of political issues and entrenched parochial organizational interests proved sufficient to forestall the ultimate conclusion of a formal NPT safeguards agreement between Japan and the IAEA. This convergence serves to illustrate the nature of both the organizational constraints and the political considerations which have impinged upon the efforts of the IAEA to conclude an agreement with the Japanese regarding safeguards coverage under the NPT. While political issues were undoubtedly a primary factor underlying the

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[23] "NPT May Not Be Introduced Into Present Diet," JAIF Weekly, February 7, 1974, AEC, AM-EMB unofficial translation, February 19, 1974.

[24] "Government to Give Up Presenting NPT to Current Diet Session," Denki Shimbun, March 5, 1974, AEC, AM-EMB unofficial translation, March 5, 1970. See also "Government Will Not Submit Nuclear Non-Proliferation Treaty to Current Session of Diet: Chief Cabinet Secretary Nikaido," Nihon Keizai, May 15, 1974, AEC, AM-EMB unofficial translation, n.d.

opposition of Moriyama and others to the establishment of a national safeguards center in Japan, it nonetheless appears that organizational characteristics, notably the tendency of the organizations involved to oppose the creation of a potentially rival organization and to act to preserve their special interests and spheres of influence, also represent significant deterrents to the efforts of the Agency to conclude an NPT safeguards agreement with the Japanese. Moreover it appears that there is little if any course of action available to the Agency to counteract the potential for domestic organizational bargaining and rivalry to impact upon Agency safeguards negotiations with the Japanese.

Subsequent progress between Japan and the IAEA regarding an NPT safeguards agreement was delayed until February, 1975. The agreement which was finally achieved at that time[25] has provided significant momentum for a revival of the debate regarding NPT ratification, although at the time of this writing, no definitive action has been taken. By March, 1975, however, it appeared that national safeguards activities would remain within the domain of the STA rather than be transferred to an independent organization.

> STA has firmed up a policy of establishing a 'national system' for domestic safeguards inspections to be conducted after Japan ratifies NPT. The following are the key points of the national system:
>
> 1. To reinforce AEB's Safeguards Office (present membership: eight) as the center of the domestic safeguards system.
> 2. To use the present laws such as the Reactor Regulation Law and the Electric Industry Law.

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[25]"Accord With IAEA Helps Open the Way for NPT Okay Here," Asahi Evening News, February 11, 1975.

> 3. Supplementary roles, such as information processing and research, to be played by the Nuclear Materials Control Center and other private organizations.
>
> STA is coordinating opinions with the Ministries concerned. It thinks that the present laws are enough not only for exercising regulation for nuclear safety but for ensuring 'peaceful uses' of atomic energy.
>
> Two years ago, STA showed the idea of a Safeguards Center as an independent corporation. It deserves attention that STA has changed its policy into the Government's leadership on domestic safeguards.[26]

This change in policy by the STA gives rise to the speculation that determination among the government organizations involved with safeguards in Japan to preserve their relative spheres of influence may have been a primary factor in forestalling the establishment of an independent national safeguards center.

The interaction and communication which has occurred among Japanese governmental organizations involved with the IAEA and the issue of safeguards under the NPT has been matched by a corresponding amount of interaction and communication among industrial organizations concerned with this issue. Some of this communication has involved only those organizations concerned with a particular stage of the fuel cycle, and appears to vary in frequency and intensity in response to the intensity with which international safeguards are applied to a given stage in this cycle. For example, in the early 1970s, at a time when IAEA safeguards were applied predominantly to research and commercial reactors in Japan, the electric power

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[26] "STA Prefers Government Leadership on Domestic Safeguards Under NPT," Denki Shimbun, March 26, 1975, AM-EMB unofficial translation, March 26, 1975.

companies established a small safeguards committee within the Federation of Electric Power Companies to which each individual company sent a representative, and which provided a forum for discussion of safeguard procedures and grievances. However, as one employee of the Nuclear Power Department of the Federation noted, given the limited potential for diversion of nuclear material from a nuclear reactor and the gradual shift in emphasis to devising safeguard measures for Japanese facilities in other stages of the nuclear fuel cycle, "international safeguards were not really onerous for electric companies . . . [IAEA] safeguarding efforts were not great at power stations and the electric companies had no on-going need to discuss safeguards and could affort to disband the safeguards group." Among organizations involved with other stages of the fuel cycle, however, notably the fuel fabrication companies, discussion and communication regarding safeguards has increased markedly, as involvement in fabrication activities and corresponding contact with international safeguards has intensified.[27]

The organizational communication which occurs among Japanese industrial companies involved with a particular stage of the nuclear fuel cycle is supplemented by the on-going communication which transpires among the entire set of Japanese industrial organizations confronted with international safeguards application and considerations. Most of this broader communication and interaction is

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[27] See, for example, Hoki S., "N-Fuel Manufacturers' View on Safeguards Under NPT," JAIF Weekly, January 28, 197, AEC, AM-EMB unofficial translation, n.d.

channeled through the Japan Atomic Industrial Forum, which has consistently played an active role in spearheading the articulation of domestic industrial views regarding safeguards. In addition to providing a forum for the on-going discussion and deliberation of international safeguards issues by industrial representatives, the JAIF has engaged in a broad range of activities to gather and disseminate information regarding IAEA safeguards. The most notable of these activities include sponsorship of an NPT safeguards survey team sent to the United States, West Germany, Belgium, France, Sweden and Austria in April, 1970;[28] the establishment of an NPT Special Committee (reorganized from NPT Problem Special Committee in May, 1972) and the organization of a small unofficial committee concerned exclusively with safeguards issues;[29] the sponsorship of conferences dealing with issues raised by the NPT, including safeguards,[30] and; the publication of Japanese and English-language newsletters and journals which provide a written record of Japanese industrial views and positions regarding a variety of issues including safeguards.[31]

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[28]"JAIF to Send Safeguard Survey Team Abroad," JAIF Weekly, April 2, 1970, AEC, AM-EMB unofficial translation, n.d.

[29]"JAIF Reorganizes NPT Committee: Toshio Doko Chairs the Committee," JAIF Weekly, May 11, 1972, AEC, AM-EMB unofficial translation, May 15, 1972.

[30]See, for example, "JAIF Holds Meeting of NPT-Concerned Persons in Government and Industry," JAIF Weekly, May 24, 1973, AEC, AM-EMB unofficial translation, May 30, 1973.

[31]These publications include the JAIF Weekly, in Japanese and the English-language journal, Atoms in Japan, published monthly.

Finally, organizational communication regarding international safeguards in Japan encompasses the communication which flows among the entire set of Japanese organizations--in government, industry and academics--which are involved with this policy. The participation of academic institutions generally involves research for and consultation with government and industrial organizations. Moreover, the various committees established to consider safeguards policy are either headed by or include eminent academic figures: the most notable of these committees, as we have noted previously, is the one headed by Professor Mukaibo of Tokyo University, who serves as Chairman of the Government's Special Advisory Committee on Safeguards. The importance of this committee was discussed in Chapter III. Table 24 provides one indication of the mechanisms for and continuous mix of government, industrial and academic organizational representatives in communication regarding international safeguards.

The course of IAEA--Japanese organizational interaction regarding safeguards, particularly in connection with the NPT, appears to indicate that the structural characteristics of the Japanese organizations involved may have had considerable impact on the nature of this interaction. At the very least the safeguard functions and responsibilities of the Agency have been compounded by the concurrent expansion in both the number and complexity of Japanese organizations involved with safeguards and the complexity and scope of international safeguards applied by the Agency. In addition to an increase in the number and complexity of safeguards considerations created for the Agency by the growth in the number of Japanese organizations affected by safeguards policy,

TABLE 24

SELECTED FORUMS FOR ORGANIZATIONAL COMMUNICATION REGARDING INTERNATIONAL SAFEGUARDS IN JAPAN

JAIF Survey Team
(April, 1970)

Leader:

Saburo Senoo
(Pres., MAPI)

Regular Members:

T. Sato (Deputy Chief, Atomic Energy Div., Chubu Electric)

S. Hoki (Managing Director, Sumitomo Atomic Energy Industries, Ltd.

K. Wake (Senior Managing Director, Furukawa Electric Co.)

H. Waraya (Director, JNF)

T. Haginoya (Deputy Chief, Metallurgical Divs., Mitsubishi Metal and Mining)

I. Watanabe (JAPCO)

Makaibo Committee
(est. 1970)

Organizations Represented:

MITI

Ministry of Transportation

AEB, STA

Science Div., Gaimushō

Official adviser, JAEC

Tokyo University

Federation of Electric Power Co.

JAPCO

PNC

JAERI

Toshiba

Furukawa Electric

Mitsubishi Metal and Mining

Sumitomo Atomic Energy Industries

JAIF NPT Committee
(reorganized May, 1972)

Chairman:

T. Doko (President, Toshiba Electric)

Organizations Represented:

PNC

JAPCO

MAPI

Toshiba

Chubu Electric

Federation of Electric Power Co.

JAERI

Tokyo University

Hitachi

TEPCO

KEPCO

Furukawa Electric

Sumitomo Electric

Nuclear Materials Control Center, Board of Directors
(January, 1974)

Chairman:

K. Komai (Chairman of the Board, Hitachi)

Executive Director:

Y. Kawashima (Former Councillor and Director of Int. Coop. Div. of AEB, STA)

Y. Shomura (V. Pres., Federation of Electric Power Companies)

S. Hashimoto (Chairman, JAIF, retired)

A. Matsui (Commissioner, JAEC)

H. Murata (V. Pres., JAERI)

M. Segawa (V. Pres., PNC)

Prof. K. Oshima (Tokyo University)

TABLE 24

(cont'd)

Advisers:

H. Murata (V. Pres., JAERI)

Y. Nakamura (Chief, Nuclear Fuel Division, PNC)

K. Takahashi (Director, JNSDA)

Observers:

JAEC Commissioners

Director General, AEB

Director, UN Bureau, Gaimushō

Deputy V. Min. for Admin., MITI

Hitachi

Mitsui Nuclear Industries

Japan Nuclear Fuel

Japan Petroleum Co.

Japan Atomic Industrial Forum

Uranium Enrichment Industries Survey Council

Gaimushō

it appears that the willingness of these organizations to accept safeguards application by the Agency may be a direct function of the extent or volume of organizational activities and resources affected by safeguards implementation. While the Japanese insistence on the utilization of national systems of nuclear material accountability by the IAEA as a primary mechanism in its application of safeguards may be regarded as a pragmatic approach to the need to maintain accurate detailed information regarding the flow of nuclear material within the country, this insistence may also reflect a desire to interject a significant mediating influence between the Agency and safeguarded Japanese organizations and eliminate direct contact between the Agency and these organizations. Moreover, it appears that the Agency has no alternative but to wait when confronted by delays in safeguards policy negotiations engendered by unresolved domestic political issues and inter-organizational bargaining and rivalry. Further, it appears that in addition to the impact of structural characteristics of Japanese organizations on IAEA--Japanese interaction, the decision-making techniques of the Japanese organizations involved may reinforce the consequences of the impact which structural qualities appear to have on this interaction.

Japanese Organizational Decision-Making and International Safeguards

In Chapter III we observed that the primary approach to decision-making in Japanese organizations appears to emphasize consensus-building. As one Japanese executive noted, "The decision-making procedure in Japan is very particular. We do not try to

force on people a decision. We want everyone to agree on an acceptable accepted decision. Of course we cannot ask all the Japanese people, but at least we must ask representative people." As was also noted in Chapter III, the policy decisions of consensus-building, based as they are on a broad agreement among diverse interests, generally tend to be stable in content over time. This emphasis on consensus-building in Japanese organizations involved with international safeguards appears to have considerable implications for the nature of Japanese interaction with the IAEA concerning safeguards implementation.

The utilization of a consensus-building approach to decision-making by Japanese organizations involved with safeguards necessitates the "gathering of many opinions" and the reconciliation of diverse views into a broadly acceptable policy. At the very least, this gathering of opinions can be and generally is, an extremely time-consuming undertaking. In a negotiating situation, the need to constantly re-consult and reaffirm the multiple views of those affected by the outcome of the negotiations can produce considerable delay, and indeed, of the various difficulties enumerated by officials in Vienna regarding the pursuit of safeguards negotiations with the Japanese, the "thousand consultations" necessitated by Japanese collective consensus-building and the resultant delays in negotiations were a frequently noted source of Agency staff frustration. In Tokyo, one United States official, in commenting on past experience in Vienna with Japanese negotiating teams described the delays ensuing from on-going Japanese consultation during negotiating sessions and remarked that "with Japanese negotiating

teams you're never absolutely sure what you're dealing with." While the delays resulting from the particular nature of the Japanese decision-making process endured by IAEA personnel involved with IAEA-Japanese safeguards negotiations are not unique to these discussions, and have characterized Japanese involvement in other negotiating situations, it is nonetheless possible to speculate that in the case of safeguards negotiations, delays may have been exaggerated to some degree to underscore Japanese desires regarding international implementation of safeguards measures and, more importantly, to forestall confrontation with broader issues, notably defense and national security considerations, raised by the NPT.

In addition to contributing to the delays characterizing IAEA--Japanese interaction regarding safeguards, it appears possible that the nature of Japanese organizational decision-making may have contributed to both the nature and the stability of organizational views regarding safeguards. This seems particularly true in regard to Japanese industrial organizations involved with safeguards. There is a general consensus in both Vienna and Tokyo, that the initial articulation of Japanese reservations regarding safeguards per se and NPT safeguards in particular came from Japanese industrial circles, and notably from the Japan Atomic Power Company (JAPCO), which as a result of its role as pioneer in the realm of commercial nuclear reactors came into early and continuous contact with IAEA safeguards efforts. While the nature of the reservations expressed was a function of direct experience with Agency safeguards application, the dissemination of views regarding safeguards was probably facilitated by the on-going continuous consultation and

communication underlying the process of consensus-building decision-making. Thus the experience of JAPCO with international safeguards and the resultant opinions and views of these experiences were readily transmitted to other industrial organizations, particularly the electric power companies. The significance of the ready transmittal of views regarding safeguards from JAPCO to the electric power companies and particularly Tokyo Electric Power Company, facilitated by the close network of communications connecting these organizations and the established procedure of consultation as a basis for decision-making, should not be underrated. Described as the most important industrial company in Japan, Tokyo Electric alone and particularly in conjunction with the other electric power companies, was in a position to wield considerable influence in shaping industrial response and policy regarding international safeguards. In accord with established procedure and existing organizational routine, these companies utilized the Federation of Electric Power Companies to consolidate their views regarding safeguards and present them to the government. Establishment of a safeguards committee by the electric power companies within the Federation provided a supplementary mechanism for the collection and reconciliation of company positions regarding safeguards and increased the amount of safeguards information available to the Federation. The views of the electric power companies and notably the reservations regarding safeguards expressed by JAPCO were readily transmitted through existing organizational channels of communication, particularly the Japan Atomic Industrial Forum, to other companies within the nuclear industry and could have

contributed to the speed and consistency with which an increasing number of industrial companies expressed similar reservations regarding safeguards application by the end of the 1960s. Thus, the on-going inter-organizational consultation inherent in consensus decision-making and underlying the process of determining and articulating industrial views regarding safeguards may have been a significant factor in determining the nature of Japanese industrial response to IAEA safeguards as well as contributing to the stability which has characterized the nature of industrial reservations concerning safeguards. Moreover, reliance on consensus-building and pre-established channels of inter-organizational communication may have facilitated the virtually unanimous decision within the nuclear industry to call for adoption of NPT safeguards and NPT ratification once industrial apprehensions and reservations had been dispelled through the outcome of Japanese-IAEA NPT safeguards negotiations.

Finally, it should be noted that the Japanese organizational approach of consensus-building decision-making appears to have had considerable importance in shaping the outcome of efforts in late 1973 and early 1974 to establish a national safeguards center in Japan. As we noted in Chapter III, the notion of consensus-building is based on the idea of reconciling divergent views of all interested parties, presuming that all involved are in fundamental agreement regarding the need for and general parameters of action. Thus, "extremists" or those thoroughly opposed to a given policy or course of action are excluded from the elaborate deliberative process underlying the ultimate emergence of consensus. In late

1973, when efforts were intensitying to establish a national safeguards center, these efforts were based on a consensus among concerned industrialists, academicians and government bureaucrats that such a Center was desirable. This consensus had been achieved without the participation of Japanese politicians, however, and ultimately political figures outside the scope of this consensus were the major source of the loss of momentum behind efforts to establish a safeguards center. As one Japanese executive noted in January, 1974,

> It is imperative to IAEA negotiations to set up a national safeguards system, which Japan has insisted, must be treated by IAEA on same basis as Agency's treatment of EURATOM system. IAEA has requested Japan to set up a national system, and based on Japan's agreement to do so, the Agency and Japan arrived at an agreement regarding NPT safeguards.
>
> The Ministry of Finance was very enthusiastic about establishing a national safeguards center. Unfortunately, the Minister of STA, Moriyama, opposes the NPT and thought it would be better to delay negotiations in Japan over NPT ratification. So STA didn't work very hard (to gain funding for national center)--as a result very senior politicians intervened in this and the result was that instead of establishing a new corporation, a certain number of inspectors were allocated to the Safeguards Office of the AEB . . .
>
> The original idea of a National Safeguards Center was not accepted by the Ministry of Finance and the Administrative Control Agency. This Agency is always controlling behavior of administrative organizations in government departments. Their views are usually reflected in the case of setting up a new organization . . . Naturally they want to avoid establishment of new government organizations because these organizations once established have a tendency to grow and expand.

While it is not possible to state with absolute certainty that the nature of the organizational decision-making process underlying Japanese involvement with IAEA implementation of international

safeguards and NPT safeguards negotiations has had a major impact in determining the nature of this interaction, there does appear to be considerable support for the assertion that this impact may be considerable. The delays which characterized negotiations with the Agency regarding NPT safeguards as well as the nature and consistency of organizational reservations regarding international safeguards application and the nature of Japanese organizational bargaining regarding safeguards in Japan may all reflect the nature of the organizational decision-making techniques underlying organizational involvement with safeguards. Moreover, it appears that this impact may be reinforced by the nature of the Japanese decision-makers involved with organizational interaction regarding safeguards.

Japanese Organizational Personnel and International Safeguards

In Chapter III, we observed that organizational characteristics and individual personality traits combine to determine the potential for Japanese individuals to affect the nature of the interaction which has transpired between Japan and the IAEA regarding safeguards. For those individuals engaged in the on-going routine aspects of IAEA-Japanese organizational interaction, organizational characteristics appear to be particularly dominant in shaping the potential for these staff members to influence the nature of Japan's safeguards policy and relationship with the IAEA, for these individuals are predominantly lower level professional staff employees and their actions are accordingly circumscribed by the narrow limits of the responsibilities associated with their organizational role. For the small group of organizational

executives who constitute the decision-makers involved with safeguards policy in Japan, organizational variables--notably organizational rank and seniority--also appear to be primary considerations in shaping the potential of each of these men to influence policy. Yet it also appears that within this group, individual personality traits and skills are an important factor in determining the magnitude of individual impact on policy formation.

In both Vienna and Tokyo, the majority of officials interviewed for this study identified a small number of Japanese individuals as the major delineators of Japanese policy regarding safeguards. Of these individuals, one, Imai Ryukichi, was consistently named as the dominant figure behind the formation of Japan's safeguards policy. Imai's involvement with safeguards serves to illustrate the complex interplay of organizational variables and personal characteristics which reinforce the capacity of an individual to affect the nature of safeguards policy in Japan. In one sense, Imai is the exception that proves the rule: of the individuals intensely involved with safeguards policy in Japan, the organizational rank of Imai--that of Deputy Manager of the Department of Engineering of the JAPCO and advisor to the Ministry of Foreign Affairs--is probably the lowest. Recognition of the disparity between Imai's organizational rank and his dominant role regarding safeguards policy prompted one American official in Tokyo to remark that "Imai seems to be involved in policy matters above the level of his organizational position." Several explanations for this seeming contradiction can be found however: of these, perhaps the most salient relates to the nature of the established

system for personnel promotion in Japanese organization. Imai became involved with international safeguards as a result of his association with a Professor Sagane, who, in accord with standard Japanese procedure, acted as Imai's sponsor and patron at the beginning of Imai's career. From Sagane, who was the first to serve as consultant regarding safeguards matters to the Ministry of Foreign Affairs, Imai received "almost the entire package of his (Sagane's) involvement with safeguards." Before Imai had risen to a high executive position in JAPCO, however, Sagane died: loss of a sponsor represents a major setback to the career advancement of his proteges in Japan, and for Imai, it meant the end to the possibility of rapid ascendancy within the organizational ranks of JAPCO.

Despite his relatively low organizational position, however, several factors have combined to reinforce Imai's efficacy in the realm of Japanese safeguards policy. Two of these factors illustrate the salience of organizational considerations in shaping individual impact on policy and include Imai's long-term involvement with JAPCO, which was one of the first Japanese organizations to become significantly affected by international safeguards, and Imai's access to and utilization of established channels of organizational communication between JAPCO and the electric power companies to articulate reservations and concerns regarding international safeguards policy. Two other factors, however, illustrate the importance of individual personal traits, namely, Imai's early involvement with safeguards policy and his resultant expertise in this realm, together with his impressive command of the English language.

As one Japanese official noted, "many Japanese, top experts in their field, sit silent at international conventions because they cannot express themselves in English. The language barrier is a terrible thing." Imai himself attributes a part of the freedom he feels to take initiatives and make proposals in policy-making forums to the support given him by other members of the Japanese delegation, some of whom are his former classmates, and "maybe because I was free from being one in government service." Thus it appears that the convergence of organizational factors and personal attributes is a sine qua non in determining Imai's ability to influence safeguards policy formation in Japan. This influence has been felt in a number of ways: several officials in Vienna attribute the first articulation of concern regarding international safeguards among Japanese nuclear industrialists to Imai; Imai has participated in all of the negotiating sessions that have been held between the Agency and the Japanese regarding NPT safeguards; virtually everything that has been published in either Japanese or English regarding the Japanese position on safeguards has been written by Imai or one of his close associates. In regard to Japanese input into INFCIRC/153, Imai notes "we know Article 7 by heart, for we wrote it."

The extent to which the views of Imai have had an impact in shaping both the nature of the response of Japan's nuclear industry to international safeguards as well as the nature of Japan's official policy regarding safeguards is apparent from the content of this policy. Given Imai's acknowledged dominance within the circle of Japanese decision-makers involved with international

safeguards policy, it is interesting to note that several officials in Vienna spoke of Imai's role as one of "support" performed "in the background." Thus it appears that despite Imai's unquestionable impact on Japanese decision-making regarding safeguards, this impact may be somewhat obscure to those outside the Japanese decision-making process (for reasons which were discussed in Chapter III), and the actual dimensions of his personal contribution may be known only to those actually involved in this process.

As the above narrative has attempted to demonstrate, a variety of considerations appear to indicate that several internal characteristics of the organizations involved with international safeguards in Japan seem to have had considerable impact on the nature of the interaction which has transpired between these organizations and the IAEA regarding safeguards policy. As the number of Japanese organizations involved with safeguards has grown, as the complexity of this involvement has increased, and as the volume of organizational resources and operations influenced by this policy has expanded, the number of serious reservations expressed by Japanese organizations regarding international safeguards has tended to increase. The course of the interaction which has transpired between the IAEA and the Japanese in an on-going attempt to eliminate the sources of Japanese reservations regarding international safeguards suggests that a variety of organizational variables, including organizational techniques of decision-making, parochial organizational operations and interests, organizational bargaining and rivalry as well as inputs from specific organizational employees have had considerable impact in shaping the nature of this

interaction. The implications of this interaction for the future course of the IAEA's involvement with international safeguards in Japan as well as the implications of the Agency's safeguarding experience in Japan for its future role regarding safeguards implementation will be examined in Chapter V.

CHAPTER V

INTERNATIONAL SAFEGUARDS, ORGANIZATIONAL INTERACTION, AND THE FUTURE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY

As we noted in Chapter I, a number of developments in the international system in recent years has prompted analysts of international organization to engage in an intensifying effort to evaluate the present capacity and future potential of international organizations to serve as mechanisms for dealing with international problems of concern to all nations. Confronted with issues involving population control, food production and distribution, and control of nuclear weapons, to name only a few, government officials, scholars and others are becoming increasingly aware of the growing need for effective means of channeling and regulating the diverse efforts of independent sovereign states to cope with these and a variety of other issue-areas of unprecedented scope and complexity.

In conjunction with the efforts of analysts to gain some insight into the capacity of international organizations to provide a means for dealing with difficult international problems, we have focused in this study on the efforts of one international organization, the International Atomic Energy Agency, to develop and implement the policy of international safeguards within the Japanese national organizational context. As one official at the IAEA observed, the original conceptualization of international safeguards, as articulated in the Baruch plan of 1946, "instituted something

completely new--a control system on states implemented by an international organization. This notion/system does not exist to any significant degree in any realm other than safeguards." Thus, this study was undertaken with the hope that examination of the efforts of the IAEA to administer international safeguards within a given national context could provide at least some indication of the nature of the considerations impinging upon these efforts to coordinate a measure of international regulation with the activities of independent sovereign states. Moreover it was hoped that examination of the present efforts of the IAEA to implement a given control function might provide some basis for speculation regarding its future capacity to serve as a regulatory mechanism in the international system.

Of the myriad factors which have influenced the attempts of the IAEA to implement international safeguards in Japan, we have asserted here that the nature of the organizational interaction which has transpired between the IAEA and the Japanese regarding safeguards may be one of the most significant. Moreover, we have suggested that the nature of this interaction is at least in part a function of the nature of the organizations involved, their structure, techniques of decision-making, and personnel. In Chapter II we examined the international organizational context out of which international safeguards policy has emerged. In Chapter III we focused on some of the specific characteristics of the Japanese organizations involved with international safeguards, and in Chapter IV attempted to identify ways in which these characteristics may have influenced the nature of the interaction which has

transpired between the IAEA and the Japanese regarding safeguards. Here we shall attempt to suggest the extent to which the Agency's experience in Japan regarding safeguards may provide insight into the future of the Agency and its involvement with the regulatory function called safeguards.

At the outset, several caveats are in order. Given the case study nature of the approach utilized in this thesis, the material presented in the preceding chapters provides little scientific basis for generalization regarding the activities of other international organizations. Moreover many of the conditions and considerations which have influenced the Agency's efforts to implement safeguards in Japan are unique to the Japanese situation and may not be relevant to other national contexts. Thus, any observations made on the basis of the foregoing analysis should be regarded as suggestive or speculative, not conclusive.

Given these caveats, it appears that examination of the interaction which has transpired between the IAEA and Japanese organizations regarding safeguards implementation can provide considerable insight into conditions which shape both the Agency's present involvement with and future prospects for safeguards implementation. As we attempted to demonstrate in Chapter IV, the nature of the national organizational context with which the Agency must deal in its efforts to administer international safeguards appears to have considerable impact in shaping the outcome of these efforts. Some of the characteristics of the Japanese organizations which we examined in Chapters III and IV are a function of conditions generally thought of as somewhat unique to the Japanese cultural

context; thus, while influential in shaping Agency involvement in the Japanese organizational context, they may be inoperative in other national organizational contexts. Other characteristics of the Japanese organizations involved with safeguards, however, appear to be less a product of Japanese cultural considerations and therefore may be of more general relevance to Agency safeguard endeavors in other nations. In the sections which follow, we will attempt to distinguish those aspects of the Japanese organizational context which appear to be strongly influenced by Japanese cultural considerations from those less a function of these considerations, and attempt to assess their implications for the present and future course of IAEA safeguards efforts. Before we begin, however, it is important to note that several internal characteristics of the IAEA itself appear to have a discernable effect on the Agency's interaction with Japanese organizations regarding safeguards; thus, let us briefly review these characteristics and attempt to suggest the nature of this impact.

Internal Characteristics of the IAEA and Safeguards Implementation

While the primary concern of this thesis has been to examine the course of IAEA involvement with safeguards administration in Japan and to suggest the extent to which this involvement and Agency interaction with Japanese organizations regarding safeguards may have been influenced by the nature of the national organizations involved, there appears to be at least some basis for the speculation that the internal characteristics of the Agency, which were described in Chapter II, may also have considerable impact on this

involvement. Among these characteristics, several are particularly notable, and include inter alia, those related to the recruitment and training of Agency personnel, and considerations stemming from the nature of the decision-making processes of the Agency.

As we noted in Chapter II, the IAEA is obligated by its Statute to recruit its staff on as wide a geographical basis as possible, and to keep its permanent staff to a minimum. In conjunction with these strictures, many of the professional level staff appointments at the Agency tend to be for a fixed term of two years, and turnover of personnel tends to be relatively rapid.

The effect of these Agency operating procedures on its capacity to implement safeguards appears to be considerable. Recruitment of personnel adequately trained in the theory and technology of safeguards from developing member-states has proven difficult at best; consequently much of the staff of the Secretariat's Department of Safeguards tends to be drawn from relatively or significantly developed nations. Many of these states are in direct competition for portions of the world market for nuclear material and facilities, and consequently are reluctant to allow an Agency inspector, a national of a more or less equally developed competitor nation, to, in the words of one Agency official, "poke around" their nuclear facilities. It should also be noted that the wide recruitment of Agency personnel for the Department of Safeguards enables many individuals intensely engaged in nuclear development in their respective states to become familiar with the nature and shortcomings of Agency efforts to implement international safeguards. In the case of Japan, a number of highly-placed officials have

served a term of duty at the Agency. While the feeling of familiarity with the IAEA which results from serving in Vienna can have the effect of reassuring these various individuals about the intentions and dimensions of Agency efforts to further the development of safeguards policy, it also appears, at least in the case of Japan, to have resulted in confirming the worst fears of some individuals regarding safeguards implementation.

The reluctance of states to accept international inspection of their nuclear facilities by a national of a potential or present competitor state has been reinforced by the relatively rapid turnover of Agency inspector personnel, and by the practice, only recently modified, of training Agency inspectors through on-the-job practical experience. The informality of this approach appears to have produced a rather rigid adherence by Agency inspectors to the letter of the safeguards law in the fulfillment of inspection responsibilities. While this approach may serve to minimize uncertainty for Agency inspectors in the conducting of inspections in a variety of national contexts and to reinforce the uniformity of inspection procedures across diverse national contexts, little allowance is made for the cultural variations inherent in these contexts. Thus, as one American official in Tokyo noted,

> "The calibre of IAEA inspectors may not be very high in the realm of tact, and it is very easy for them to make mistakes in a social system such as Japan about which they are uninformed. For example, a fifty-year old operator of a nuclear facility in Japan who has gained his job on the basis of seniority is not likely to take kindly to orders issued by a twenty-five year old international inspector. Hence it is relatively easy for an inspector to create friction without realizing he is doing so simply by carrying out

his job as he sees fit."

The extent to which the problem of adequate training for Agency inspectors is compounded by a relatively rapid turnover of lower level professional staff, including inspectors, may be significant. Several Japanese officials noted that the turnover of Agency inspectors tends to reinforce misgivings regarding the potential for industrial espionage associated with international inspections.

Finally, it should be noted that the nature of the decision-making process of the Agency's Secretariat and the predominant role played by executive level personnel in this process, has led to situations wherein the practical problems and dilemmas which arise as a result of lower-level staff efforts to administer safeguards in various national contexts are channeled upward for resolution. The implications of this tendency for lower level issues to be dealt with at the executive level of the IAEA appear to be at least twofold. On the one hand, the decisions of executive level personnel regarding a given problem or issue may not be responsive to the practical issues involved. On the other hand, the involvement of Agency executives in the resolution of lower level issues may create the distorted impression of unwarranted urgency or importance regarding the issue. Considerations such as these tend to give weight to the speculation that the internal characteristics of the IAEA associated with its modus operandi appear to have considerable impact on Agency efforts to implement international safeguards.

The Japanese Organizational Context and Safeguards Implementation

In Chapters III and IV, we detailed the nature of the Japanese organizational context involved with international safeguards and attempted to suggest ways in which the nature of this context has impacted upon IAEA efforts to apply and extend safeguards coverage in Japan. It is important to emphasize that much of the Agency's experience in Japan has been shaped by characteristics unique to the Japanese cultural and organizational context, which are not necessarily operative within other national contexts involved with international safeguards. The most notable of these characteristics include: 1) the extraordinary sensitivity of the Japanese to the dimensions of safeguards application by the IAEA; 2) the Japanese emphasis on consensus-building decision-making, and; 3) the close ties which characterize relations between the Japanese government and Japan's nuclear industry.

As we observed in the preceding chapters, initial Japanese willingness to submit to the application of safeguards by the IAEA was a function of a number of considerations, resulting principally from Japan's wartime defeat and its subsequent dependence on the United States, as well as from the modest scope and nature of the initial safeguards procedures delineated by the Agency. Within a decade following the first application of international safeguards in Japan in 1959, the growth of the Japanese nuclear industry and the concurrent expansion of IAEA safeguards in Japan had prompted the Japanese to search for means to minimize the dimensions and effects of international safeguards application. While Japanese concern with the nature and extent of international safeguards administration in

their country stems predominantly from economic and political considerations, several officials in both Vienna and Tokyo noted the psychological component of this concern. One official in Vienna noted that

> "the Japanese are pathologically sensitive (to the application of safeguards) owing to their experience in World War II and their experience as international outcasts following the war. With their industrial upsurge the feeling grew among the Japanese that they must be treated like everyone else. They have a 'why pick on me' type of feeling."

Another official noted that the Japanese are "sensitive about being IAEA guinea pigs" and are "sensitive about being held up as major targets of IAEA safeguards." Emphasis on this unique sensitivity of the Japanese resulting from their role as the initial focal point and continued target of international safeguards was reiterated in Tokyo by a number of Japanese officials. Thus it appears that this Japanese psychological sensitivity to the administration of international safeguards in Japan by the IAEA may have played a significant role in shaping the Japanese reaction to safeguards and influenced Japanese efforts to effect a reduction in the intensity and dimensions of Agency involvement with safeguards in Japan.

The nature of the Japanese reaction to IAEA efforts to implement international safeguards has also been shaped by the interaction of two considerations, discussed in Chapters III and IV, namely, the Japanese emphasis on consensus-building decision-making and the close ties which link the Japanese nuclear industry and the Japanese government. Since these considerations have been discussed previously, it is only necessary here to emphasize that the interplay of an emphasis on consensus and the consistent and

cooperative nature of government and nuclear industry ties in Japan has served both to facilitate inter-organizational communication regarding international safeguards and to enable government and industry to present a united front in their articulation of demands and requests for policy changes and modifications to the IAEA. Several officials in Vienna commented upon the interlocking nature of the Japanese government and the nuclear industry and noted that this interlock obscures the bargaining and dissention which transpires prior to the emergence of consensus among the representatives of the various Japanese organizations involved with international safeguards. The tendency of the Japanese to enter into negotiations with the IAEA on the basis of a predetermined policy consensus among all Japanese organizations concerned creates a rather formidable and tenacious counterpart for Agency personnel involved with safeguards talks with the Japanese. The nature of the broad consensus underlying the policy demands presented by the Japanese to the Agency, and the time-consuming processes involved in renegotiating consensus among all interested parties in Japan should the Agency seek to modify Japanese demands, combine to reinforce a stable, even rigid adherence by Japanese delegations to the demands they articulate in negotiations with the Agency regarding safeguards.

Safeguards Implementation and the Future of the IAEA

While the IAEA's experience in Japan regarding the administration of international safeguards and the Japanese response to the actions of the Agency have been shaped by many considerations unique to the Japanese cultural and organizational context, it also

appears that a number of more general considerations have been raised by the interaction of the IAEA and Japanese organizations regarding safeguards which affect the capacity of the IAEA to implement safeguards in this organizational context. Indeed, it appears that the nature of the IAEA's past and present involvement with safeguards in Japan serves both to highlight several broadly applicable practical requirements of international safeguards implementation and to raise a number of fundamental questions regarding the assumptions underlying safeguards policy per se and the Agency's future involvement with this policy.

Of the practical requirements for safeguards implementation highlighted by IAEA-Japanese organizational interaction, two are particularly noteworthy, namely, the need for clear organizational communication and the need for established adequate routines as a basis for action by an international organization within a national organizational context. The importance of these requirements has been repeatedly demonstrated during the course of routine Agency-Japanese organizational interaction regarding non-NPT safeguards.

Of the various considerations most often cited during interviews in both Vienna and Tokyo as sources of friction in IAEA--Japanese interaction regarding non-NPT safeguards implementation, the most frequently emphasized was the difficulty resulting from inadequate organizational communication. Both Agency and Japanese officials consistently enumerated the problems associated with their interaction which result from the omnipresent barrier of language. In Vienna, one official in close contact with the

Japanese noted,

> "Language makes dealing with the Japanese difficult. The nuances of the (Japanese) language are so damnably infinite. One phrase is subject to a variety of interpretations. Also the language tends to make the Japanese always indirect, not direct in their approach. For example, a friend of mine once asked a Japanese cab driver if there had been much rain lately and received the reply 'The rice paddies are green.'"

In Tokyo, Japanese officials repeatedly noted the embarassment created for the operators of nuclear facilities by their inability to communicate with IAEA inspectors. As one official noted, "only one IAEA inspector can speak Japanese . . ." The problem is compounded when neither the international inspector nor the Japanese operator is conversant in English; thus

> "If IAEA inspectors have misgivings (regarding the operation of a nuclear facility or the use of nuclear material), it is often difficult for Japanese knowing little English to ease their suspicions. When an inspector doesn't speak English and the people in the AEB who are involved in safeguards don't speak English well, there is a two-sided language obstacle . . . This leads to a poor confidence level."

Many of the Japanese interviewed for this study felt that the problems connected with the Tsuruga incident were compounded by the language barrier: when IAEA inspectors unexpectedly arrived at the facility late at night or early in the morning, only a small contingent of facility staff was on hand, none of whom were fluent in English. Thus the level of mutual misunderstanding tended to escalate.

In addition to highlighting the need for clear communication, the interaction which has transpired between the IAEA and Japanese national organizations regarding non-NPT safeguards tends to

illustrate the need for established routines on which to base this interaction. In Chapter IV we noted that the establishment of both the precedent and mechanism for routine organizational interaction early in the course of contact between the Agency and the Japanese regarding non-NPT safeguards may have played an important role in facilitating the extension of non-NPT safeguards coverage by the Agency during the 1960s. Moreover several Japanese officials emphasized that the problems which have arisen during the course of interaction with the Agency regarding non-NPT safeguards implementation have resulted not from the routine application of safeguards measures by the Agency but rather from the breakdown or inadequacy of organizational routines underlying interaction. Thus the need for the IAEA to define and maintain a predictable pattern of performance in regard to safeguards implementation, and particularly in regard to inspection activities was repeatedly reiterated. In commenting upon Agency inspections, one prominent Japanese industrialist noted that

> "In the practice of routine inspections, IAEA inspectors want to know too much--questions seem to go beyond role of inspecting . . . Japan wants a standard manual laying out inspection procedures to guarantee a predictable level of performance by IAEA inspectors. Japan does not want to have variation in inspection procedures. Gradually inspections are becoming standardized, but there is still no inspection manual. Moreover the IAEA does not allow the inspected country to see the manual kept by its inspectors."

Neither the need for clear inter-organizational communication nor the need for defined organizational routines as a basis for action by an international organization within a national context is a requirement unique to IAEA-Japanese organizational interaction

regarding safeguards. Indeed, it appears likely that efforts by the IAEA to satisfy these requirements could serve to facilitate Agency activity regarding safeguards in a variety of other national organizational contexts.

In addition to the practical requirements of safeguards implementation highlighted by the IAEA's safeguarding experience in Japan, this experience serves to illuminate a number of fundamental questions and issues regarding safeguards implementation which appear to have profound implications for shaping the nature of the Agency's future involvement with safeguards policy. Many of these questions and issues are intimately intertwined and relate to the nature of the assumptions underlying international safeguards policy as well as the nature of the Agency's future role concerning this policy.

At the time when the concept of international safeguards was first articulated, and indeed, until recently, the idea of safeguards was based in part on the assumption that those states with the technological and industrial capacity to do so would seek to develop nuclear weapons. Moreover, it was assumed that clandestine development of nuclear weapons would maximize their utility by enabling a state to introduce an unexpected powerful resource into a given international conflict or negotiation. In the late 1960s, the Non-Proliferation Treaty was regarded as an important effort to curtail the spread of nuclear weapons, and the safeguards connected with this Treaty were expected to serve as a credible means of detecting clandestine nuclear weapons development by a state and thereby act as a deterrent to this type of activity. The importance attributed to the NPT and the safeguards associated

with it served to reinforce the expectation among a number of observers that IAEA involvement with NPT safeguards would result in a dramatic escalation in the Agency's importance and prestige; as Scheinman has observed,

> The NPT . . . requires all nonnuclear weapon states that ratify the treaty to place their nuclear facilities under IAEA safeguards. Once implemented, this provision will radically expand the scope of the Agency's control activities and catapult it from its present modest position in the United Nations family to a place among the most important international agencies.[1]

In recent years, events and changes in the international community have prompted a number of government officials and scholars concerned with the NPT and its safeguards policy to question if not abandon their beliefs regarding the importance of the Treaty and the policies connected with it. Few near-nuclear nations, including Japan, have made a serious effort to join the ranks of the Nuclear-Weapon States. Government officials and scholars in a number of nations have drawn attention to the liabilities associated with the possession of nuclear weapons and have undermined the prestige initially associated with possession of these weapons to a considerable degree. Moreover many states' governments have increasingly challenged the utility of participating in an unequal treaty which places demands and expectations upon Non-Nuclear-Weapon States which are not similarly imposed upon Nuclear-Weapon States.

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[1] Lawrence Scheinman, "IAEA: Atomic Condominium?" in Robert W. Cox and Harold K. Jacobson, The Anatomy of Influence (New Haven, Yale University Press, 1973), p. 224.

In conjunction with the doubts and questions raised regarding the assumptions and merits of the NPT, a number of analysts have increasingly questioned both the utility of the safeguards connected with this Treaty and the role of the IAEA regarding NPT safeguards. At one extreme, some analysts have argued that clandestine development of nuclear weapons may be of little advantage in international interaction and therefore if a given state choses to "go nuclear" it will do so openly. Thus, according to these analysts, the fundamental purpose underlying the policy of international safeguards, namely, the timely detection of secret diversion of nuclear material from peaceful purposes to non-peaceful uses, and IAEA involvement with this policy, is essentially superfluous. Even those analysts concerned with maintaining the concept and policy of international safeguards and the IAEA's role regarding safeguards have expressed grave doubts about the future viability of this policy. The ever-increasing number of states involved with nuclear development, coupled with the increasing diversity and complexity of this involvement and the exponentially increasing volume of nuclear material in circulation in these states, as exemplified by the development of the Japanese nuclear industry, have served to reinforce the beliefs of observers who feel that the IAEA lacks both the manpower and resources necessary to provide adequate safeguards coverage of the nuclear facilities of Non-Nuclear-Weapon States party to the NPT. Moreover, the concern and reservations of many analysts has been intensified by the relatively recent introduction of the concept of national systems of nuclear material accountability.

Of the various events which have led to a reappraisal of the

assumptions underlying the NPT, NPT safeguards, and the role of the IAEA regarding safeguards policy, it appears that the introduction of the concept of a national system of nuclear material accountability could have the greatest impact in determining the future nature of international safeguards policy and the role performed by the IAEA in regard to this policy. In Chapter IV we examined the efforts of the Japanese to insure the inclusion of Article 7, which provides for the use of national systems of nuclear material accountability by the IAEA as a basis for its NPT safeguards activities, in the Model Agreement for safeguards under the NPT (see Appendix 3). While these efforts by the Japanese were based primarily on their concern for protecting the development and competitive status of their domestic nuclear industry, the Japanese insistence on the use of national systems by the IAEA has raised a number of broader issues regarding the future dimensions of Agency involvement with safeguards.

At the very heart of the issues raised by the concept of national systems is the question of whether, assuming the continued application of international safeguards to a variety of nation-states, there is any correlation between the dimension of IAEA direct involvement with safeguards administration and the effectiveness of this policy. Those in favor of the use of national systems by the Agency argue that these systems provide an important means whereby the Agency can improve its capacity to coordinate the regulatory function of safeguards with the activities of the nation-states submitting to safeguards. According to these individuals, it will be easier psychologically for the national facilities

involved to accept international safeguards if they are under the surveillance of their own nations. Any resentment or hostility generated as a result of inspections will be directed at the national safeguards facility, not at the international organization. Moreover, use of a national system of nuclear material accountability will enable the IAEA to collect the meticulous detailed up-to-date information that is the sine qua non of effective safeguards. Those individuals unimpressed by the alleged advantages attributed to the use of national systems by the IAEA, however, point out that reliance by the Agency on these systems could produce a gradual but significant erosion in the Agency's safeguarding activities and eventually reduce the policy of international safeguards and the Agency's role regarding this regulatory function to the level of ineffectual symbolism. For those who regard IAEA involvement with international safeguards as an important indicator of the capacity of an international organization to further the development of a regulatory function at the potential expense of traditional state sovereignty, this prospect is dismaying at best.

Given the diversity and importance of the consideration raised by the concept of national systems of nuclear material accountability and the impact which these systems could have on the safeguarding functions of the IAEA, any attempt to assess the future potential of the Agency to implement international safeguards appears problematic at best. Yet, on the basis of the Agency's experience regarding safeguards administration in the Japanese national organizational context, it may not be inappropriate to suggest that the bulk of the responsibility for safeguards implementation will

be assumed in the future by national systems, with a corresponding decline in IAEA safeguards activities. If this is the case, the concept and policy of safeguards will cease to represent a significant effort to coordinate international regulation with national control of nuclear material and represent merely a necessary part of a nation-state's efforts to account for the nuclear material within its boundaries. The extent to which a decline in its regulatory functions regarding safeguards would correspond with an increase in the service functions performed by the IAEA is unclear; there is a distinct possibility, however, that future observers of the Agency will witness a gradual reallocation of Agency resources and manpower to the exclusive pursuit of service functions assigned to it by its sovereign nation-state members.

APPENDIX 1

THE AGENCY'S SAFEGUARDS

(INFCIRC/26, March 30, 1961)

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I. INTRODUCTION

1. Under Article III.A.5 of the Statute the Agency is authorized "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 way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or, at the request of a State, to any of that State's activities in the field of atomic energy."

2. The principles and procedures established for the information and appropriate guidance of Member States as well as for the guidance of the Board itself in the administration of safeguards by the Agency, are based on the pertinent provisions of the Statute and enable:

(a) A State or group of States applying for assistance by or through the Agency to consider in advance the nature of the safeguards that the Agency would attach;

(b) The parties to a bilateral or multilateral arrangement, or a State, to determine how Agency safeguards might be applied to their activities if they so request; and

(c) The Board to determine readily what safeguards should be attached to Agency projects or applied to arrangements that the Agency has been requested to safeguard, and embodied in the relevant agreements.

3. Agency safeguards will be applied to materials and facilities voluntarily placed under Agency safeguards by a State or States. Where two or more States request the Agency to administer the safeguards provisions of an agreement between those States, the Agency will apply those provisions provided that they are consistent with the procedures laid down in this document. The administration of safeguards by the Agency under this paragraph shall be governed by an agreement pursuant to the Statute between the Agency and the State or States concerned which shall be made for a specified period.

4. This document specifies:

(a) The principles that are to be followed by the Agency in determining the safeguards that are to be attached and applied to various types of assistance, and

(b) The procedures to implement these principles.

The safeguards procedures cover the anticipated requirements by the Agency in the immediate future and relate only to research, test and power reactors with less than 100 megawatts thermal output, to the source and special fissionable material used and produced in these reactors and to small research and development facilities. Procedures covering other types of nuclear facilities will be developed as the probable need for them becomes evident. In regard to produced material, the safeguards provided for in this document relate only to first generation produced material.

5. The principles and procedures for the attachment and application

of safeguards by the Agency which are set forth hereafter shall be subject to a general review after two years, in the light of the actual experience gained by the Agency as well as of the technological development which has taken place.

II. DEFINITIONS

6. "Agency" means the International Atomic Energy Agency.
7. "Statute" means the Statute of the Agency.
8. "Board" means the Board of Governors of the Agency.
9. "Director General" means the Director General of the Agency.
10. "Nuclear material" means any source and/or special fissionable material as defined in Article XX of the Statute.
11. "Enrichment" means the percentage by weight of the isotope uranium-235 in the total uranium present.
12. "Depleted uranium" means uranium in which the percentage by weight of the isotope uranium-235 in the total uranium present is less than that occurring in natural uranium.
13. "Reactor" means any device that can be operated so as to maintain a controlled, self-sustaining fission chain reaction.
14. "Reactor facility" means a reactor including appurtenant facilities such as fuel storage or cooling facilities or other portions of the plant in which nuclear materials are handled or used.
15. "Principal nuclear facility" means reactor facilities, plants for processing special fissionalbe or irradiated source material, plants for separating the isotopes of uranium or isotopes of plutonium and such other facilities or plants which may be designated by the Board.
16. "Supplied or processed by the Agency" means supplied or processed by the Agency directly, or supplied or processed with the assistance of the Agency when, in the opinion of the Board, that assistance is of a substantial nature.
17. "Diversion" means the use by a recipient State of fissionable or other materials, facilities or equipment supplied by the Agency so as to further any military purpose or in violation of any other condition prescribed in the agreement between the Agency and the State concerning the use of such materials, facilities or equipment.
18. "Agency safeguards" means the measures pursuant to the Statute to prevent loss or diversion of materials, specialized equipment or principal nuclear facilities.
19. "Attachment of safeguards" means the requirement to apply appropriate safeguard procedures.
20. "Application of safeguards" to materials or facilities means the implementation of appropriate safeguards procedures.
21. "PN[1] material" and "PN facility" means materials and facilities:
    (a) Supplied by the Agency or to which Agency safeguards are otherwise attached;

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[1]This abbreviation means "peaceful nuclear."

(b) Placed under Agency safeguards by agreement with the State or States concerned;
(c) Allocated by a State for peaceful purposes exclusively, provided the State concerned voluntarily sends the Agency notification thereof in connection with Agency safeguards; or
(d) Supplied from a source external to a State under an agreement that they shall not be used to further a military purpose or otherwise safeguarded in that State by other organizations or States, provided that all parties concerned shall have voluntarily notified the Agency in connection with Agency safeguards of the material or facilities supplied or otherwise safeguarded in the State so that the Agency can take account thereof.

III. PRINCIPLES OF AGENCY SAFEGUARDS

A. General principles

22. The principal factors considered by the Board for determining the relevance of particular safeguards for various types of materials and facilities will depend upon the form, scope and amount of the assistance supplied by the Agency, the specific character of each individual project and the degree to which the assistance can further a military purpose. The Agency and the State with which a safeguards agreement is to be concluded, will take into account all pertinent circumstances existing at the time.
23. The provisions of this document together with any other provisions which may be agreed upon in the course of negotiations will only become legally binding after the entry into force of a specific agreement including such provisions.

B. Principles of attachment

24. The attachment of Agency safeguards to Agency projects will take into consideration all PN materials and PN facilities in the State.
25. Agency safeguards will be attached to nuclear material supplied by the Agency whenever the total amount of PN material in a State exceeds a certain minimum, and will also be attached to special fissionable material produced in or by the use of material to which Agency safeguards are thus attached. Agency safeguards will be attached to nuclear material used, produced or processed in a principal nuclear facility to which Agency safeguards are attached.
26. Agency safeguards will be attached to principal nuclear facilities supplied or substantially assisted by the Agency.[2] If in the opinion of the Board specialized equipment or non-nuclear material supplied by the Agency could substantially assist a principal nuclear facility or could in other ways further a military

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[2] Subject to the exemptions provided for in paragraph 36 below.

purpose, Agency safeguards will be attached to such equipment or material even when it is not in a principal nuclear facility.

27. No Agency safeguards will be attached to mines, to mining equipment or to ore-processing plants.

C. Principles of application

28. The application of Agency safeguards to Agency projects will take into consideration all PN materials and PN facilities in the State.

29. Agency safeguards will be applied to:

(a) Nuclear material to which Agency safeguards are attached;

(b) Nuclear material while it is intermixed with nuclear material to which Agency safeguards are attached; and

(c) Nuclear material in Member States to which Agency safeguards are attached at the request of Member States.

30. Agency safeguards will be applied to:

(a) Facilities[3] to which Agency safeguards are attached;

(b) Facilities[3] while they are processing, using, or storing materials to which Agency safeguards are attached; and

(c) Facilities[3] in Member States to which Agency safeguards are attached at the request of Member States.

31. Agency safeguards will be applied to specialized equipment and non-nuclear materials to which Agency safeguards are attached and to facilities[3] incorporating these items.

IV. ATTACHMENT AND TERMINATION OF AGENCY SAFEGUARDS

A. Attachment to nuclear materials

32. (a) Agency safeguards will be attached to source material supplied by the Agency and to special fissionable material produced in or by the use of such material, except when the quantity of PN source material in a State, including the material supplied by the Agency, does not exceed:

(i) In the case of natural uranium or depleted uranium with a uranium-235 content of 0.5 per cent or greater - 10 metric tons;

(ii) In the case of depleted uranium with

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[3]The word "facility" is used in the sense defined in paragraphs 14 and 15 taken together.

a uranium-235 content of less than 0.5 per cent - 20 metric tons;
(iii) In the case of thorium - 20 metric tons.

(b) Agency safeguards will be attached to special fissionable material supplied by the Agency and to special fissionable material produced in or by the use of such material, except when the quantity of PN special fissionable material in a State, including the material supplied by the Agency, does not exceed 200 grams of plutonium, uranium-233 or fully enriched uranium or its equivalent in the case of partially enriched uranium.[4] Safeguards will be applied in a nominal manner when the amount of PN special fissionable material in a State does not exceed 1000 grams.[4]

33. Agency safeguards will be attached to special fissionable material produced in a principal nuclear facility to which Agency safeguards are attached.

34. Agency safeguards will be attached to nuclear material processed or used in a principal nuclear facility to which Agency safeguards are attached.

35. Agency safeguards will be attached to all special fissionable material produced in a reactor to which Agency safeguards are not attached but which contains nuclear material to which Agency are attached, if such material permits the reactor to operate at more than 200 per cent of the power at which it could operate without such material.

B. Attachment to facilities, equipment and non-nuclear material

36. Agency safeguards will be attached to principal nuclear facilities supplied or, in the opinion of the Board, substantially assisted by the Agency. Reactors which, after an inspection at initial criticality, are assessed by the Board to have a maximum calculated power for continuous operation of less than 3 thermal megawatts shall be exempted from such attachment provided that the total such power of reactors thus exempted in any State may not exceed 6 thermal megawatts.

37. Agency safeguards will be attached to specialized equipment and non-nuclear material supplied by the Agency, which in the opinion of the Board could substantially assist a principal nuclear facility, other than a reactor with a maximum calculated power for continuous operation of less than 3 thermal megawatts, or could in other ways further a military purpose, even when such specialized equipment or non-nuclear material is not in a principal nuclear facility. The

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[4] Equivalent amounts can be determined from the equation in the Appendix. The equivalent amounts of plutonium and uranium-233 are the same as for fully enriched uranium.

Board may from time to time designate certain specific specialized equipment and non-nuclear material as being items which would be considered capable of substantially assisting a principal nuclear facility or in other ways of furthering a military purpose.

C. Termination or suspension of Agency safeguards

38. The attachment of Agency safeguards to a facility, to materials or to equipment will terminate when there are no conditions as listed in paragraphs 32 to 37 above that require attachment of Agency safeguards.

39. The attachment of Agency safeguards to nuclear material will be suspended while it is transferred solely for the purpose of processing, reprocessing or testing to any other Member State or to any group of States or to an international organization under an agreement between the parties concerned approved by the Agency, or to a facility within the State to which safeguards are not attached under an arrangement approved by the Agency, provided that:

(a) The agreement or the arrangement requires that a party thereto place under Agency safeguards, at a time to be agreed and with due allowance for processing losses, an amount of nuclear material at least equal to that transferred between States or within a Member State and not otherwise subject to safeguards; or

(b) The quantities of materials so received or sent out by any State in accordance with this paragraph are not at any time in excess of the amounts shown in sub-paragraph 32(a) above in the case of source material, or 1000 grams of plutonium, uranium-233 or fully enriched uranium or its equivalent in the case of special fissionable material.

V. APPLICATION OF AGENCY SAFEGUARDS

A. General procedures concerning application to all types of facilities and materials

(a) Introduction

40. Agency safeguards will be applied to facilities and to materials in facilities in accordance with agreements entered into by the Agency with the State or States concerned. The application of such safeguards shall be as specified in the agreements and may extend, as appropriate, to the following:

(a) The Agency shall examine the design and approve it only from the viewpoint of assuring that it will not further any military purpose and that it will permit effective application of Agency safeguards;

(b) The State shall maintain a system of records as agreed with the Agency of the material and facilities to which Agency safeguards are to be applied;

(c) The State shall submit to the Agency routine and special reports on the facilities and the materials under safeguards; and

(d) The State shall permit inspections by the Agency to account for material to which Agency safeguards are applied and to detect diversion.

41. The Agency staff shall not disclose any industrial secret or other confidential information coming to their knowledge by reason of the application of Agency safeguards except to the Director General and such other staff of the Agency as he may authorize to have such information for discharging their official duties.

(b) Procedure for approval of design

42. The design of facilities existing at the time of the signing of the project agreement shall be approved by the Agency in order to determine, in so far as it is able, whether the facility will further any military purpose and that the facility will permit the effective application of Agency safeguards. In the event of additional facilities being designed which require the application of safeguards or in the event of a substantial change in the design of facilities already approved under the project agreement, the State will advise the Agency accordingly and submit such designs for examination and approval together with any information that the Agency may request.

43. The Agency shall make its decision about approval of these designs as expeditiously as possible after the submission of the information by the State.

(c) Procedure for agreement of the records system

44. The State shall agree with the Agency a plan for the system of records for each facility and material to which Agency safeguards are to be applied. A draft of this plan shall be submitted by the State in sufficient time to permit review by the Agency and adoption by the State of an agreed system before the records need to be used. Any changes in this plan shall similarly be agreed with the Agency.

45. The records shall include operating records for nuclear facilities, as well as accounting records of material and equipment, to which Agency safeguards are applied.

46. All records shall be retained for at least two years.

(d) Procedure for submission of reports

(i) General considerations

47. The State shall agree with the Agency a plan for the system of reports for each facility and material to which Agency safeguards are to be applied. A draft of this plan shall be submitted by the State in sufficient time to permit review by the Agency and adoption by the State of the agreed plan before the first report is required to be submitted.

(ii) Routine reports

48. The State shall submit the following routine reports to the Agency:

(a) Operating reports showing the use that has been

made of the facility and the material in the facility since the last report and as far as possible the program of work which is going to be carried out in the facility and with the material; and

(b) Accounting reports showing the receipt, issue and location of the material to which Agency safeguards are applied.

49. The State shall submit the first routine report at the time of the first operation of the facility under Agency safeguards or at the time when material to which Agency safeguards are attached is first received at the facility.

50. At the request of the Agency the State shall submit amplifications or elucidations of routine reports referred to in paragraph 48 above, in the event of unusual circumstances as determined by the Agency.

(iii) Special reports

51. The State shall notify the Agency within forty-eight hours by the most expeditious means available:

(a) If any unusual incident occurs, involving an actual or potential loss, destruction or damage of any facility or material to which Agency safeguards are applied; or

(b) If material is lost or unaccounted for in quantities that exceed those normal operating losses or unaccounted-for quantities that are accepted by the Agency to be characteristic of the facility involved.

52. The State shall submit to the Agency a report at least two weeks before:

(a) Any proposed transfer or other transaction that will result in a change in the quantity of materials to which Agency safeguards are applied in the State, or a significant change in any facility or complex of facilities considered as a unit for this purpose by agreement with the Agency; and

(b) Any proposed major change in the planned future program as reported in the routine reports.

53. The State shall submit any additional special reports requested by the Agency concerning matters referred to in paragraphs 51 and 52 above.

(e) Procedure for inspections

(i) Routine inspections

54. The Agency may make routine inspections of the facility and material to which Agency safeguards are applied, beginning at a time specified in the project agreement.

55. Inspections will include the examination of the facility to ensure that it is constructed in accordance with the approved design, and the testing of any equipment or instruments that are to be used to measure material in the facility to which Agency safeguards are to be applied. The testing of instruments and equipment shall be carried out only to the extent necessary to test their proper functioning, without reference to their design.

56. Routine inspections after the facility is in operation shall normally include:

(a) Examination of the facility and/or material to which Agency safeguards are applied;

(b) Audit of reports and records;

(c) Verification of the amounts of material to which Agency safeguards are applied, by physical inspection, measurement and sampling; and

(d) Examination and testing of the measurement instruments.

57. If the Agency considers that all the routine inspections that are authorized are not required, fewer inspections may be carried out.

(ii) Special inspections

58. If an examination of the special reports made under paragraphs 51 and 52 above indicates the need for a special inspection, the Agency is entitled to carry out such an inspection, to investigate the occurrence.

59. In the event of unforeseen circumstances requiring immediate action, a special inspection may be made provided that a report shall be made to the Board on the circumstances leading to such inspection.

(f) Nominal safeguards

60. If the quantitities of PN special fissionable material in the State are such that material supplied by the Agency qualifies for the application of safeguards in a nominal manner as specified in sub-paragraph 32(b) above the following shall apply:

(a) Only one routine report shall be required each year regarding the material and the facilities which are processing, using, or storing such material;

(b) No routine inspections shall be carried out; and

(c) Special reports will be submitted and special inspections performed as necessary.

B. Additional procedures for application to reactor facilities

(a) Introduction

61. The following additional provisions apply to reactor facilities. In the present procedures only reactors below 100 thermal megawatts are considered.

(b) Frequency of routine reports

62. The frequency of routine reports for a facility shall normally be twice a year. The actual frequency for a given facility shall be determined in relation to the frequency of inspection of that facility.

(c) Frequency of routine inspections

63. Routine inspections shall be made to each facility to which safeguards are applied except those subject only to nominal safeguards.

64. The number of inspections will be kept to a minimum consistent

with the effective application of safeguards.

65. The frequency of inspection of a reactor facility shall take into account the following considerations:

(a) The possession by the State or States of an irradiated fuel reprocessing facility;

(b) The nature of the reactor facility;

(c) The nature of the nuclear material used or produced in the reactor facility; and

(d) The amount of nuclear material used or produced in the reactor facility.

In the light of these considerations, routine inspections shall be conducted at such a frequency that in the interval between inspections the total possible error in the measurement of the quantity of nuclear material used or produced by the reactor facility[5] cannot amount to more than 0.2 kilograms of plutonium, uranium-233 or fully enriched uranium-235 or their equivalents. The maximum frequency of routine inspections for a reactor facility shall be as shown in the table below. The first column of this table indicates the annual usage[6] or the maximum potential production of plutonium, uranium-233 or uranium-235 expressed in equivalent kilograms, and the second column indicates the corresponding inspection frequencies.

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[5] For the purposes of this document "the total possible error in the measurement of the quantity of nuclear material used or produced by the reactor facility" shall mean one standard deviation of the measurement.

[6] Annual usage is the equivalent yearly throughput or inventory, whichever is larger, and "equivalent" is used in the sense in which it is used in paragraph 32 above and in the Appendix.

Frequency of routine inspections[7]

Annual usage or maximum potential production of Pu, uranium-233 or uranium-235 (Equivalent kilograms)	Maximum number of routine inspections per year
From 0.2 to 1	None (Nominal safeguards)
More than 1 up to 5	1
More than 5 up to 10	2
More than 10 up to 15	3
More than 15 up to 20	4
More than 20 up to 25	5
More than 25 up to 30	6

The appropriate number of routine inspections will be stated in each project agreement and provision made therein for changes in case of changed conditions.

C. Additional procedures for application to research and development facilities other than reactor facilities

66. In this paragraph the only research and development facilities that are provided for are those in a State which possesses PN special fissionable material in quantities that qualify, in accordance with sub-paragraph 32(b) above, for the application of safeguards in a nominal manner. For such facilities the application shall be limited to that shown in paragraph 60 above.

[7] Examples of the application of the principle illustrated in the above table are given in the following table; they are calculated on the basis of typical operating conditions at the reactor facility:

Illustrative frequencies of routine inspection

Type of reactor facility	Design power	Enrichment of fuel (per cent)	Number of routine inspections per year
Homogeneous research	50 KW	20	None, subject to the provisions of paragraphs 32 and 36 above
Heavy water research	3 MW	Natural	
Pool research	1 MW	20	
Pool research	2 MW	90	
Graphite moderated research	4 MW	Natural	1
Test or large research	30 MW	20	2
Pressurized water power	40 MWT	4	2
Boiling water power	58 MWT	4.2	2
Test or large research	20 MW	90	4
Graphite moderated power	100 MWT	Natural	6

APPENDIX

Equivalent amounts of enriched uranium

1. The amount of partially enriched uranium that is equivalent to 200 grams of fully enriched uranium, is given by the equation:

$$\text{Amount of uranium in kilograms} = \frac{0.2}{\frac{(\text{Enrichment})^2}{(100)^2}}$$

2. The amount of partially enriched uranium equivalent to x kilograms of fully enriched uranium can be determined by substituting x for the figure 0.2 in the equation in paragraph 1 above.

APPENDIX 2

THE AGENCY'S SAFEGUARDS SYSTEM

(1965, AS PROVISIONALLY EXTENDED IN 1966 AND 1968)

(INFCIRC/66/Rev.2, September 16, 1968)

1. The Agency's safeguards system, as approved by the Board of Governors in 1965, and provisionally extended in 1966 and 1968, is set forth in this document for the information of all Members.

2. The development of the system from 1961 onwards has been as follows:

System		Set forth in document
Nature	Name	
The first system	The Agency's Safeguards System (1961)	INFCIRC/26
The 1961 system as extended to cover large reactor facilities	The Agency's Safeguards System (1961, as Extended in 1964)	INFCIRC/26 and Add .1
The revised system	The Agency's Safeguards System (1965)	INFCIRC/66
The revised system with additional provision for reprocessing plants	The Agency's Safeguards System (1965 as Provisionally Extended in 1966)	INFCIRC/66/ Rev.1
The revised system with further additional provisions for safeguarded nuclear material in conversion plants and fabrication plants	The Agency's Safeguards System (1965, as Provisionally Extended in 1966 and 1968)	INFCIRC/66/ Rev.2

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I. GENERAL CONSIDERATIONS

A. The purpose of this document

1. Pursuant to Article II of its Statute the Agency has the task of seeking "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world." Inasmuch as the technology of nuclear energy for peaceful purposes is closely coupled with that for the production of materials for nuclear weapons, the same Article of the Statute provides that the Agency "shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervsiion or control is not used in such a way as to further any military purpose."

2. The principal purpose of the present document is to establish a system of controls to enable the Agency to comply with this statutory obligation with respect to the activities of Member States in the field of the peaceful uses of nuclear energy, as provided in the Statute. The authority to establish such a system is provided by Article III.A.5. of the Statute, which authorizes the Agency 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 way as to further any military purpose." This Article further authorizes the Agency to "apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy." Article XII.A sets forth the rights and responsibilities that the Agency is to have, to the extent relevant, with respect to any project or arrangement which it is to safeguard.

3. The principles set forth in this document and the procedures for which it provides are established for the information of Member States, to enable them to determine in advance the circumstances and manner in which the Agency would administer safeguards, and for the guidance of the organs of the Agency itself, to enable the Board and the Director General to determine readily what provisions should be included in agreements relating to safeguards and how to interpret such provisions.

4. Provisions of this document that are relevant to a particular project, arrangement or activity in the field of nuclear energy will only become legally binding upon the entry into force of a *safeguards agreement*[1] and to the extent that they are incorporated therein. Such incorporation may be made by reference.

5. Appropriate provisions of this document may also be incorporated in bilateral or multilateral arrangements between Member States, including all those that provide for the transfer to the Agency of responsibility for administering safeguards. The Agency will not assume such responsibility unless the principles of the safeguards and the procedures to be used are essentially consistent with those

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[1] The use of italics indicates that a term has a specialized meaning in this document and is defined in Part IV.

set forth in this document.

6. Agreements incorporating provisions from the earlier version of the Agency's safeguards system[2] will continue to be administered in accordance with such provisions, unless all States parties thereto request the Agency to substitute the provisions of the present document.

7. Provisions relating to types of *principal nuclear facilities*, other than *reactors*, which may produce, process or use safeguarded *nuclear material* will be developed as necessary.

8. The principles and procedures set forth in this document shall be subject to periodic review in the light of the further experience gained by the Agency as well as of technological developments.

B. General principles of the Agency's safeguards

The Agency's obligations

9. Bearing in mind Article II of the Statute, the Agency shall implement safeguards in a manner designed to avoid hampering a State's economic or technological development.

10. The safeguards procedures set forth in this document shall be implemented in a manner designed to be consistent with prudent management practices required for the economic and safe conduct of nuclear activities.

11. In no case shall the Agency request a State to stop the construction or operation of any *principal nuclear facility* to which the Agency's safeguards procedures extend, except by explicit decision of the Board.

12. The State or States concerned and the Director General shall hold consultations regarding the application of the provisions of the present document.

13. In implementing safeguards, the Agency shall take every precaution to protect commercial and industrial secrets. No member of the Agency's staff shall disclose, except to the Director General and to such other members of the staff as the Director General may authorize to have such information by reason of their official duties in connection with safeguards, any commerical or industrial secret or any other confidential information coming to his knowledge by reason of the implementation of safeguards by the Agency.

14. The Agency shall not publish or communicate to any State, organization or person any information obtained by it in connection with the implementation of safeguards, except that:

(a) Specific information relating to such implementation in a State may be given to the Board and to such Agency staff members as require such knowledge by reason of their official duties in connection with safeguards, but only to the extent necessary for the Agency to fulfill its safeguards responsibilities;

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[2] Set forth in documents INFCIRC/26 and Add.1.

(b) Summarized lists of items being safeguarded by the Agency may be published upon decision of the Board; and
(c) Additional information may be published upon decision of the Board and if all States directly concerned agree.

Principles of implementation

15. The Agency shall implement safeguards in a State if:
(a) The Agency has concluded with the State a *project agreement* under which materials, services, equipment, facilities or information are supplied, and such agreement provides for the application of safeguards; or
(b) The State is a party to a bilateral or multilateral arrangement under which materials, services, equipment, facilities or information are supplied or otherwise transferred, and:
(i) All the parties to the arrangement have requested the Agency to administer safeguards; and
(ii) The Agency has concluded the necessary *safeguards agreement* with the State; or
(c) The Agency has been requested by the State to safeguard certain nuclear activities under the latter's jurisdiction, and the Agency has concluded the necessary *safeguards agreement* with the State.

16. In the light of Article XII.A.5 of the Statute, it is desirable that *safeguards agreements* should provide for the continuation of safeguards, subject to the provisions of this document, with respect to produced special fissionable material and to any materials substituted therefor.

17. The principal factors to be considered by the Board in determining the relevance of particular provisions of this document to various types of materials and facilities shall be the form, scope and amount of the assistance supplied, the character of each individual project and the degree to which such assistance could further any military purpose. The related *safeguards agreement* shall take account of all pertinent circumstances at the time of its conclusion.

18. In the event of any non-compliance by a State with a *safeguards agreement*, the Agency may take the measures set forth in Articles XII.A.7 and XII.C of the Statute.

II. CIRCUMSTANCES REQUIRING SAFEGUARDS

A. Nuclear materials subject to safeguards

19. Except as provided in paragraphs 21-28, *nuclear material* shall be subject to the Agency's safeguards if it is being or

has been:

(a) Supplied under a *project agreement;* or

(b) Submitted to safeguards under a *safeguards agreement* by the parties to a bilateral or multilateral arrangement; or

(c) *Unilaterally submitted* to safeguards under a *safeguards agreement;* or

(d) Produced, processed or used in a *principal nuclear facility* which has been:

(i) Supplied wholly or substantially under a *project agreement;* or

(ii) Submitted to safeguards under a *safeguards agreement* by the parties to a bilateral or multilateral arrangement; or

(iii) *Unilaterally submitted* to safeguards under a *safeguards agreement;* or

(e) Produced in or by the use of safeguarded *nuclear material.*

(f) Substituted, pursuant to paragraph 26(d), for safeguarded *nuclear material.*

20. A *principal nuclear facility* shall be considered as substantially supplied under a *project agreement* if the Board has so determined.

B. Exemptions from safeguards

General exemptions

21. *Nuclear material* that would otherwise be subject to safeguards shall be exempted from safeguards at the request of the State concerned, provided that the material so exempted in that State may not at any time exceed:

(a) 1 kilogram in total of special fissionable material, which may consist of one or more of the following:

(i) Plutonium;

(ii) Uranium with an *enrichment* of 0.2 (20%) and above, taken account of by multiplying its weight by its *enrichment;*

(iii) Uranium with an *enrichment* below 0.2 (20%) and above that of natural uranium, taken account of by multiplying its weight by five times the square of its *enrichment;*

(b) 10 metric tons in total of natural uranium and depleted uranium with an *enrichment* above 0.005 (0.5%);

(c) 20 metric tons of depleted uranium with an *enrichment* of 0.005 (0.5%) or below; and

(d) 20 metric tons of thorium.

Exemptions related to reactors

22. Produced or used *nuclear material* that would otherwise be subject to safeguards pursuant to paragraph 19(d) or (e) shall be

exempted from safeguards if:

(a) It is plutonium produced in the fuel of a *reactor* whose rate of production does not exceed 100 grams of plutonium per year; or

(b) It is produced in a *reactor* determined by the Agency to have a maximum calculated power for continuous operation of less than 3 thermal megawatts, or is used in such a *reactor* and would not be subject to safeguards except for such use, provided that the total power of the *reactors* with respect to which these exemptions apply in any State may not exceed 6 thermal megawatts.

23. Produced special fissionable material that would otherwise be subject to safeguards pursuant only to paragraph 19(e) shall in part be exempted from safeguards if it is produced in a *reactor* in which the ratio of fissionable isotopes with safeguarded *nuclear material* to all fissionable isotopes is less than 0.3 (calculated each time any change is made in the loading of the *reactor* and assumed to be maintained until the next such change). Such fraction of the produced material as corresponds to the calculated ratio shall be subject to safeguards.

C. Suspension of safeguards

24. Safeguards with respect to *nuclear material* may be suspended while the material is transferred, under an arrangement or agreement approved by the Agency, for the purpose of processing, reprocessing, testing, research or development, within the State concerned or to any other Member State or to an international organization, provided that the quantitite of *nuclear material* with respect to which safeguards are thus suspended in a State may not at any time exceed:

(a) 1 *effective kilogram* of special fissionable material;

(b) 10 metric tons in total of natural uranium and depleted uranium with an *enrichment* above 0.005 (0.5%);

(c) 20 metric tons of depleted uranium with an *enrichment* of 0.005 (0.5%) or below; and

(d) 20 metric tons of thorium.

25. Safeguards with respect to *nuclear material* in irradiated fuel which is transferred for the purpose of reprocessing may also be suspended if the State or States concerned have, with the agreement of the Agency, placed under safeguards substitute *nuclear material* in accordance with paragraph 26(d) for the period of suspension. In addition, safeguards with respect to plutonium contained in irradiated fuel which is transferred for the purpose of reprocessing may be suspended for a period not to exceed six months if the State or States concerned have, with the agreement of the Agency, placed under safeguards a quantity of uranium whose *enrichment* in the isotope uranium-235 is not less than 0.9 (90%) and the uranium-235 content of which is equal in weight to such plutonium. Upon expiration of the said six months or the completion of reprocessing, whichever is earlier, safeguards shall, with the agreement of the

Agency, be applied to such plutonium and shall cease to apply to the uranium substituted therefor.

D. Termination of safeguards

26. *Nuclear material* shall no longer be subject to safeguards after:
(a) It has been returned to the State that originally supplied it (whether directly or through the Agency), if it was subject to safeguards only by reason of such supply and if:
(i) It was not *improved* while under safeguards; or
(ii) Any special fissionable material that was produced in it under safeguards has been separated out, or safeguards with respect to such produced material have been terminated; or
(b) The Agency has determined that:
(i) It was subject to safeguards only by reason of its use in a *principal nuclear facility* specified in paragraph 19(d);
(ii) It has been removed from such facility; and
(iii) Any special fissionable material that was produced in it under safeguards has been separated out, or safeguards with respect to such produced material have been terminated; or
(c) The Agency has determined that it has been consumed, or has been diluted in such a way that it is no longer usable for any nuclear activity relevant from the point of view of safeguards, or has become practicably irrecoverable; or
(d) The State or States concerned have, with the agreement of the Agency, placed under safeguards, as a substitute, such amount of the same element, not otherwise subject to safeguards, as the Agency has determined contains fissionable isotopes:
(i) Whose weight (with due allowance for processing losses) is equal to or greater than the weight of the fissionable isotopes of the material with respect to which safeguards are to terminate; and
(ii) Whose ratio by weight to the total substituted element is similar to or greater than the ratio by weight of the fissionable isotopes of the material with respect to which safeguards are to terminate to the total weight of such material;
provided that the Agency may agree to the substitution

of plutonium for uranium-235 contained in uranium whose *enrichment* is not greater than 0.05 (5.0%); or
(e) It has been transferred out of the State under paragraph 28(d), provided that such material shall again be subject to safeguards if it is returned to the State in which the Agency had safeguarded it; or
(f) The conditions specified in the *safeguards agreement*, pursuant to which it was subject to Agency safeguards, no longer apply, by expiration of the agreement or otherwise.

27. If a State wishes to use safeguarded source material for non-nuclear purposes, such as the production of alloys or ceramics, it shall agree with the Agency on the circumstances under which the safeguards on such material may be terminated.

E. Transfer of safeguarded nuclear material out of the State

28. No safeguarded *nuclear material* shall be transferred outside the jurisdiction of the State in which it is being safeguarded until the Agency has satisfied itself that one or more of the following conditions apply:
(a) The material is being returned, under the conditions specified in paragraph 26(a), to the State that originally supplied it; or
(b) The material is being transferred subject to the provisions of paragraph 24 or 25; or
(c) Arrangements have been made by the Agency to safeguard the material in accordance with this document in the State to which it is being transferred; or
(d) The material was not subject to safeguards pursuant to a *project agreement* and will be subject, in the State to which it is being transferred, to safeguards other than those of the Agency but generally consistent with such safeguards and accepted by the Agency.

III. SAFEGUARDS PROCEDURES

A. General procedures

Introduction

29. The safeguards procedures set forth below shall be followed, as far as relevant, with respect to safeguarded *nuclear materials*, whether they are being produced, processed or used in any *principal nuclear facility* or are outside any such facility. These procedures also extend to facilities containing or to contain such materials, including *principal nuclear facilities* to which the criteria in paragraph 19(d) apply.

Design review

30. The Agency shall review the design of *principal nuclear*

facilities, for the sole purpose of satisfying itself that a facility will permit the effective application of safeguards.

31. The design review of a *principal nuclear facility* shall take place at as early a stage as possible. In particular, such review shall be carried out in the case of:

(a) An Agency project, before the project is approved;

(b) A bilateral or multilateral arrangement under which the responsibility for administering safeguards is to be transferred to the Agency, or an activity *unilaterally submitted* by a State, before the Agency assumes safeguards responsibilities with respect to the facility;

(c) A transfer of safeguarded *nuclear material* to a *principal nuclear facility* whose design has not previously been reviewed, before such transfer takes place; and

(d) A significant modification of a *principal nuclear facility* whose design has previously been reviewed, before such modification is undertaken.

32. To enable the Agency to perform the required design review, the State shall submit to it relevant design information sufficient for the purpose, including information on such basic characteristics of the *principal nuclear facility* as may bear on the Agency's safeguards procedures. The Agency shall require only the minimum amount of information and data consistent with carrying out its responsibility under this section. It shall complete the review promptly after the submission of this information by the State and shall notify the latter of its conclusions without delay.

Records

33. The State shall arrange for the keeping of records with respect to *principal nuclear facilities* and also with respect to all safeguarded *nuclear material* outside such facilities. For this purpose the State and the Agency shall agree on a system of records with respect to each facility and also with respect to such material, on the basis of proposals to be submitted by the State in sufficient time to allow the Agency to review them before the records need to be kept.

34. If the records are not kept in one of the working languages of the Board, the State shall make arrangements to facilitate their examination by inspectors.

35. The records shall consist, as appropriate, of:

(a) Accounting records of all safeguarded *nuclear material;* and

(b) Operating records for *principal nuclear facilities*.

36. All records shall be retained for at least two years.

Reports

General requirements

37. The State shall submit to the Agency reports with respect to

the production, processing and use of safeguarded *nuclear material* in or outside *principal nuclear facilities*. For this purpose the State and the Agency shall agree on a system of reports with respect to each facility and also with respect to safeguarded *nuclear material* outside such facilities, on the basis of proposals to be submitted by the State in sufficient time to allow the Agency to review them before the reports need to be submitted. The reports need include only such information as is relevant for the purpose of safeguards.

38. Unless otherwise provided in the applicable *safeguards agreement*, reports shall be submitted in one of the working languages of the Board.

Routine reports

39. Routine reports shall be based on the records compiled in accordance with paragraphs 33-36 and shall consist, as appropriate, of:

(a) Accounting reports showing the receipt, transfer out, inventory and use of all safeguarded *nuclear material*. The inventory shall indicate the nuclear and chemical composition and physical form of all material and its location on the date of the report; and

(b) Operating reports showing the use that has been made of each *principal nuclear facility* since the last report and, as far as possible, the programme of future work in the period until the next routine report is expected to reach the Agency.

40. The first routine report shall be submitted as soon as:

(a) There is any safeguarded *nuclear material* to be accounted for; or

(b) The *principal nuclear facility* to which it relates is in a condition to operate.

Progress in construction

41. The Agency may, if so provided in a *safeguards agreement*, request information as to when particular stages in the construction of a *principal nuclear facility* have been or are to be reached.

Special reports

42. The State shall report to the Agency without delay:

(a) If any unusual incident occurs involving actual or potential loss or destruction of, or damage to, any safeguarded *nuclear material* or *principal nuclear facility;* or

(b) If there is good reason to believe that safeguarded *nuclear material* is lost or unaccounted for in quantities that exceed the normal operating and handling losses that have been accepted by the Agency as characteristic of the facility.

43. The State shall report to the Agency, as soon as possible, and in any case within two weeks, any transfer not requiring advance notification that will result in a significant change (to be defined

by the Agency in agreement with the State) in the quantity of safeguarded *nuclear material* in a facility, or in a complex of facilities considered as a unit for this purpose by agreement with the Agency. Such report shall indicate the amount and nature of the material and its intended use.

Amplification of reports

44. At the Agency's request the State shall submit amplifications or clarifications of any report, in so far as relevant for the purpose of safeguards.

Inspections

General procedures

45. The Agency may inspect safeguarded *nuclear materials* and *principal nuclear facilities*.

46. The purpose of safeguards inspections shall be to verify compliance with *safeguards agreements* and to assist States in complying with such agreements and in resolving any questions arising out of the implementation of safeguards.

47. The number, duration and intensity of inspections actually carried out shall be kept to the minimum consistent with the effective implementation of safeguards, and if the Agency considers that the authorized inspections are not all required, fewer shall be carried out.

48. Inspectors shall neither operate any facility themselves nor direct the staff of a facility to carry out any particular operation.

Routine inspections

49. Routine inspections may include, as appropriate:
(a) Audit of records and reports;
(b) Verification of the amount of safeguarded *nuclear material* by physical inspection, measurement and sampling;
(c) Examination of *principal nuclear facilities*, including a check of their measuring instruments and operating characteristics; and
(d) Check of the operations carried out at *principal nuclear facilities* and at *research and development facilities* containing safeguarded

50. Whenever the Agency has the right of access to a *principal nuclear facility* at all times[3], it may perform inspections of which notice as required by paragraph 4 of the *Inspectors Document* need not be given, in so far as this is necessary for the effective application of safeguards. The actual procedures to implement these provisions shall be agreed upon between the parties concerned in the *safeguards agreement*.

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[3] See para. 57.

Initial inspections of principal nuclear facilities

51. To verify that the construction of a *principal nuclear facility* is in accordance with the design reviewed by the Agency, an initial inspection or inspections of the facility may be carried out, if so provided in a *safeguards agreement:*

(a) As soon as possible after the facility has come under Agency safeguards, in the case of a facility already in operation; or

(b) Before the facility starts to operate, in other cases.

52. The measuring instruments and operating characteristics of the facility shall be reviewed to the extent necessary for the purpose of implementing safeguards. Instruments that will be used to obtain data on the *nuclear materials* in the facility may be tested to determine their satisfactory functioning. Such testing may include the observation by inspectors of commissioning or routine tests by the staff of the facility, but shall not hamper or delay the construction, commissioning or normal operation of the facility.

Special inspections

53. The Agency may carry out special inspections if:

(a) The study of a report indicates that such inspection is desirable; or

(b) Any unforeseen circumstance requires immediate action.

The Board shall subsequently be informed of the reasons for and the results of each such inspection.

54. The Agency may also carry out special inspections of substantial amounts of safeguarded *nuclear material* that are to be transferred outside the jurisdiction of the State in which it is being safeguarded, for which purpose the State shall give the Agency sufficient advance notice of any such proposed transfer.

B. Special procedures for reactors

Reports

55. The frequency of submission of routine reports shall be agreed between the Agency and the State, taking into account the frequency established for routine inspections. However, at least two such reports shall be submitted each year and in no case shall more than 12 such reports be required in any year.

Inspections

56. One of the initial inspections of a *reactor* shall if possible be made just before the reactor first reaches criticality.

57. The maximum frequency of routine inspections of a *reactor* and of the safeguarded *nuclear material* in it shall be determined from the following table:

Whichever is the largest of: (a) Facility inventory (including loading); (b) Annual *throughput;* (c) Maximum potential annual production of special fissionable material (*Effective kilograms of nuclear material)*	Maximum number of routine inspections annually
Up to 1	0
More than 1 and up to 5	1
More than 5 and up to 10	2
More than 10 and up to 15	3
More than 15 and up to 20	4
More than 20 and up to 25	5
More than 25 and up to 30	6
More than 30 and up to 35	7
More than 35 and up to 40	8
More than 40 and up to 45	9
More than 45 and up to 50	10
More than 50 and up to 55	11
More than 55 and up to 60	12
More than 60	Right of access at all times

58. The actual frequency of inspection of a *reactor* shall take account of:

(a) Whether the State possesses irradiated-fuel reprocessing facilities;
(b) The nature of the *reactor;* and
(c) The nature and amount of the *nuclear material* produced or used in the *reactor*.

C. Special procedures relating to safeguarded nuclear material outside principal nuclear facilities

Nuclear material in research and development facilities

Routine reports

59. Only accounting reports need be submitted in respect of *nuclear material* in *research and development facilities*. The frequency of submission of such routine reports shall be agreed between the Agency and the State, taking into account the frequency established for routine inspections; however, at least one such report shall be submitted each year and in no case shall more than 12 such reports be required in any year.

Routine inspections

60. The maximum frequency of routine inspections of safeguarded *nuclear material* in a *research and development facility* shall be that specified in the table in paragraph 57 for the total amount of material in the facility.

Source material in sealed storage

61. The following simplified procedures for safeguarding stockpiled source material shall be applied if a State undertakes to store such material in a sealed storage facility and not to remove it therefrom without previously informing the Agency.

Design of storage facilities

62. The State shall submit to the Agency information on the design of each sealed storage facility and agree with the Agency on the method and procedure for sealing it.

Routine reports

63. Two routine accounting reports in respect of source material in sealed storage shall be submitted each year.

Routine inspections

64. The Agency may perform one routine inspection of each sealed storage facility annually.

Removal of material

65. The State may remove safeguarded source material from a sealed storage facility after informing the Agency of the amount, type and intended use of the material to be removed, and providing sufficient other data in time to enable the Agency to continue safeguarding the material after it has been removed.

Nuclear material in other locations

66. Except to the extent that safeguarded *nuclear material* outside of *principal nuclear facilities* is covered by any of the provisions set forth in paragraphs 59-65, the following procedures shall be applied with respect to such material (for example, source material stored elsewhere than in a sealed storage facility, or special fissionable material used in a sealed neutron source in the field).

Routine reports

67. Routine accounting reports in respect of all safeguarded *nuclear material* in this category shall be submitted periodically. The frequency of submission of such reports shall be agreed between the Agency and the State, taking into account the frequency established for routine inspections; however, at least one such report shall be submitted each year and in no case shall more than 12 such reports be required in any year.

Routine inspections

68. The maximum frequency of routine inspections of safeguarded *nuclear material* in this category shall be one inspection annually if the total amount of such material does not exceed five *effective kilograms*, and shall be determined from the table in paragraph 57 if the amount is greater.

IV. DEFINITIONS

69. "Agency" means the International Atomic Energy Agency.
70. "Board" means the Board of Governors of the Agency.
71. "Director General" means the Director General of the Agency.
72. "Effective kilograms" means:
    (a) In the case of plutonium, its weight in kilograms;
    (b) In the case of uranium with an *enrichment* of 0.01 (1%) and above, its weight in kilograms multiplied by the square of its *enrichment;*
    (c) In the case of uranium with an *enrichment* below 0.01 (1%) and above 0.005 (0.5%), its weight in kilograms multiplied by 0.0001; and
    (d) In the case of depleted uranium with an *enrichment* of 0.005 (0.5%) or below, and in the case of thorium, its weight in kilograms multiplied by 0.00005.
73. "Enrichment" means the ratio of the combined weight of the isotopes uranium-233 and uranium-235 to that of the total uranium in question.
74. "Improved" means, with respect to *nuclear material*, that either:
    (a) The concentration of fissionable isotopes in it has been increased; or
    (b) The amount of chemically separable fissionable isotopes in it has been increased; or
    (c) Its chemical or physical form has been changed

so as to facilitate further use or processing.

75. "Inspector" means an Agency official designated in accordance with the *Inspectors Document*.

76. "Inspectors Document" means the Annex to the Agency's document GC(V)/INF/39.

77. "Nuclear material" means any source or special fissionable material as defined in Article XX of the Statute.

78. "Principal nuclear facility" means a *reactor*, a plant for processing *nuclear material* irradiated in a *reactor*, a plant for separating the isotopes of a *nuclear material*, a plant for processing or fabricating *nuclear material* (excepting a mine or ore-processing plant) or a facility or plant of such other type as may be designated by the Board from time to time, including associated storage facilities.

79. "Project agreement" means a *safeguards agreement* relating to an Agency project and containing provisions as foreseen in Article XI.F.4(b) of the Statute.

80. "Reactor" means any device in which a controlled, self-sustaining fission chain-reaction can be maintained.

81. "Research and development facility" means a facility, other than a *principal nuclear facility*, used for research or development in the field of nuclear energy.

82. "Safeguards agreement" means an agreement between the Agency and one or more Member States which contains an undertaking by one or more of those States not to use certain items in such a way as to further any military purpose and which gives the Agency the right to observe compliance with such undertaking. Such an agreement may concern:

(a) An Agency project;

(b) A bilateral or multilateral arrangement in the field of nuclear energy under which the Agency may be asked to administer safeguards; or

(c) Any of a State's nuclear activities *unilaterally submitted* to Agency safeguards.

83. "Statute" means the Statute of the Agency.

84. "Throughput" means the rate at which *nuclear material* is introduced into a facility operating at full capacity.

85. "Unilaterally submitted" means submitted by a State to Agency safeguards, pursuant to a *safeguards agreement*.

ANNEX I

PROVISIONS FOR REPROCESSING PLANTS

Introduction

1. The Agency's Safeguards System (1965) is so formulated as to permit application to *principal nuclear facilities* other than *reactors* as foreseen in paragraph 7. This Annex lays down the additional procedures which are applicable to the safeguarding of *reprocessing plants*. However, because of the possible need to revise these procedures in the light of experience, they shall be subject to review at any time and shall in any case be reviewed after two years' experience of their application has been gained.

Special procedures

Reports

2. The frequency of submission of routine reports shall be once each calendar month.

Inspections

3. A *reprocessing plant* having an annual *throughput* not exceeding 5 *effective kilograms* of *nuclear material*, and the safeguarded *nuclear material* in it, may be routinely inspected twice a year. A *reprocessing plant* having an annual *throughput* exceeding 5 *effective kilograms* of *nuclear material*, and the safeguarded *nuclear material* in it, may be inspected at all times. The arrangements for inspections set forth in paragraph 50 shall apply to all inspections to be made under this paragraph.[1]

4. When a *reprocessing plant* is under Agency safeguards only because it contains safeguarded *nuclear material*, the inspection frequency shall be based on the rate of delivery of safeguarded *nuclear material*.

5. The State and the Agency shall co-operate in making all the necessary arrangements to facilitate the taking, shipping or analysis of samples, due account being taken of the limitations imposed by the characteristics of a plant already in operation when placed under Agency safeguards.

Mixtures of safeguarded and unsafeguarded nuclear material

6. By agreement between the State and the Agency, the following special arrangements may be made in the case of a *reprocessing plant* to which the criteria in paragraph 19(d) do not apply, and in which safeguarded and unsafeguarded *nuclear materials* are present:

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[1] It is understood that for plants having an annual *throughput* of more than 60 *effective kilograms*, the right of access at all times would normally be implemented by means of continuous inspection.

(a) Subject to the provisions of sub-paragraph (b) below, the Agency shall restrict its safeguards procedures to the area in which irradiated fuel is stored, until such time as all or any part of such fuel is transferred out of the storage area into other parts of the plant. Safeguards procedures shall cease to apply to the storage area or plant when either contains no safeguarded *nuclear material;* and

(b) Where possible safeguarded *nuclear material* shall be measured and sampled separately from unsafeguarded material, and at as early a stage as possible. Where separate measurement, sampling or processing are not possible, the whole of the material being processed in that *campaign* shall be subject to the safeguards procedures set out in this Annex. At the conclusion of the processing the *nuclear material* that is thereafter to be safeguarded shall be selected by agreement between the State and the Agency from the whole output of the plant resulting from that *campaign,* due account being taken of any processing losses accepted by the Agency.

DEFINITIONS

7. "Reprocessing plant"[2] means a facility to separate irradiated *nuclear materials* and fission products, and includes the facility's head-end treatment section and its associated storage and analytical sections.

8. "Campaign" means the period during which the chemical processing equipment in a *reprocessing plant* is operated between two successive wash-outs of the *nuclear material* present in the equipment.

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[2]This term is synonymous with the term "a plant for processing nuclear material irradiated in a reactor" which is used in paragraph 78.

ANNEX II

PROVISIONS FOR SAFEGUARDED NUCLEAR MATERIAL IN

CONVERSION PLANTS AND FABRICATION PLANTS

Introduction

1. The Agency's Safeguards System (1965, as Provisionally Extended in 1966) is so formulated as to permit application to *principal nuclear facilities* other than *reactors* as foreseen in paragraph 7. This Annex lays down the additional procedures which are applicable to safeguarded *nuclear material* in *conversion plants* and *fabrication plants*.[1] However, because of the possible need to revise these procedures in the light of experience, they shall be subject to review at any time and shall in any case be reviewed after two years' experience of their application has been gained.

Special procedures

Reports

2. The frequency of submission of routine reports shall be once each calendar month.

Inspections

3. A *conversion plant* or *fabrication plant* to which the criteria in paragraph 19(d) apply and the *nuclear material* in it, may be inspected at all times if the plant inventory at any time, or the annual input, of *nuclear material* exceeds five *effective kilograms*. Where neither the inventory at any time, nor the annual input, exceeds five *effective kilograms* of *nuclear material*, the routine inspections shall not exceed two a year. The arrangements for inspection set forth in paragraph 50 shall apply to all inspections to be made under this paragraph.[2]

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[1] This terminology is intended to be synonymous with the term "a plant for processing or fabricating *nuclear material* (excepting a mine or ore-processing plant") which is used in paragraph 78.

[2] It is understood that for plants having an inventory at any time, or an annual input, or more than 60 *effective kilograms* the right of access at all times would normally be implemented by means of continuous inspection. Where neither the inventory at any time nor the annual input exceeds one *effective kilogram* of *nuclear material* the plant would not normally be subject to routine inspection.

4. When a *conversion plant* or *fabrication plant* to which the criteria in paragraph 19(d) do not apply contains safeguarded *nuclear material* the frequency of routine inspections shall be based on the inventory at any time and the annual input of safeguarded *nuclear material*. Where the inventory at any time, or the annual input, of safeguarded *nuclear material* exceeds five *effective kilograms* the plant may be inspected at all times. Where neither the inventory at any time, nor the annual input, exceeds five *effective kilograms* of safeguarded *nuclear material* the routine inspections shall not exceed two a year. The arrangements for inspection set forth in paragraph 50 shall apply to all inspections to be made under this paragraph.[2]

5. The intensity of inspection of safeguarded *nuclear material* at various steps in a *conversion plant* or *fabrication plant* shall take account of the nature, isotopic composition and amount of safeguarded *nuclear material* in the plant. Safeguards shall be applied in accordance with the general principles set forth in paragraphs 9-14. Emphasis shall be placed on inspection to control uranium of high enrichments and plutonium.

6. Where a plant may handle safeguarded and unsafeguarded *nulcear material*, the State shall notify the Agency in advance of the programme for handling safeguarded batches to enable the Agency to make inspections during these periods, due account being also taken of the arrangements under paragraph 10 below.

7. The State and the Agency shall co-operate in making all the necessary arrangements to facilitatethe preparation of inventories of safeguarded *nuclear material* and the taking, shipping and/or analysis of samples, due account being taken of the limitation imposed by the characteristics of a plant already in operation when placed under Agency safeguards.

Residues, scrap and waste

8. The State shall ensure that safeguarded *nuclear material* contained in residues, scrap or waste created during conversion or fabrication is recovered, as far as is practicable, in its facilities and within a reasonable period of time. If such recovery is not considered practicable by the State, the State and the Agency shall co-operate in making arrangements to account for and dispose of the material.

Safeguarded and unsafeguarded nuclear material

9. By agreement between the State and the Agency, the following special arrangements may be made in the case of a *conversion plant* or a *fabrication plant* to which the criteria in paragraph 19(d) do not apply, and in which safeguarded and unsafeguarded *nuclear material* are both present:

(a) Subject to the provisions of sub-paragraph (b) below, the Agency shall restrict its safeguards procedures to the area in which safeguarded *nuclear material* is stored, until such time as all or any part of such *nuclear material* is transferred out of the storage area into other parts of the plant. Safeguards procedures shall cease to be applied

to the storage area or plant when it contains no safeguarded *nuclear material;* and

(b) Where possible, safeguarded *nuclear material* shall be measured and sampled separately from unsafeguarded *nuclear material,* and at as early a stage as possible. Where separate measurement, sampling or processing is not possible, any *nuclear material* containing safeguarded *nuclear material* shall be subject to the safeguards procedures set out in this Annex. At the conclusion of processing, the *nuclear material* that is therafter to be safeguarded shall be selected, in accordance with paragraph 11 below when applicable, by agreement between the State and the Agency, due account being taken of any processing losses accepted by the Agency.

Blending of nuclear material

10. When safeguarded *nuclear material* is to be blended with either safeguarded or unsafeguarded *nuclear material,* the State shall notify the Agency sufficiently in advance of the programme of blending to enable the Agency to exercise its right to obtain evidence, through inspection of the blending operation or otherwise, that the blending is performed according to the programme.

11. When safeguarded and unsafeguarded *nuclear material* are blended, if the ratio of fissionable isotopes in the safeguarded component going into the blend to all the fissionable isotopes in the blend is 0.3 or greater, and if the concentration of fissionable isotopes in the unsafeguarded *nuclear material* is increased by such blending, then the whole blend shall remain subject to safeguards. In other cases the following procedures shall apply:

(a) Plutonium/plutonium blending. The quantity of the blend that shall continue to be safeguarded shall be such that its weight, when multiplied by the square of the weight fraction of contained fissionable isotopes, is not less than the weight of originally safeguarded plutonium multiplied by the square of the weight fraction of fissionable isotopes therein, provided however that:

(i) In cases where the weight of the whole blend, when multiplied by the square of the weight fraction of contained fissionable isotopes, is less than the weight of originally safeguarded plutonium multiplied by the square of the weight fraction of fissionable isotopes therein, the whole of the blend shall be safeguarded; and

(ii) The number of fissionable atoms in the portion of the blend that shall continue to be under safeguards shall in no case be less than the number

of fissionable atoms in the originally safeguarded plutonium;

(b) Uranium/uranium blending. The quantity of the blend that shall continue to be safeguarded shall be such that the number of *effective kilograms* is not less than the number of *effective kilograms* in the originally safeguarded uranium, provided however that:

(i) In cases where the number of *effective kilograms* in the whole blend is less than in the safeguarded uranium, the whole of the blend shall be safeguarded; and

(ii) The number of fissionable atoms in the portion of the blend that shall continue to be under safeguards shall in no case be less than the number of fissionable atoms in the originally safeguarded uranium;

(c) Uranium/plutonium blending. The whole of the resultant blend shall be safeguarded until the uranium and the plutonium constituents are separated. After separation of the uranium and plutonium, safeguards shall apply to the originally safeguarded component; and

(d) Due account shall be taken of any processing losses agreed upon between the State and the Agency.

DEFINITIONS

12. "Conversion plant" means a facility (excepting a mine or ore-processing plant) to *improve* unirradiated *nuclear material*, or irradiated *nuclear material* that has been separated from fission products, by changing its chemical or physical form so as to facilitate further use or processing. The term *conversion plant* includes the facility's storage and analytical sections. The term does not include a plant intended for separating the isotopes of a *nuclear material*.

13. "Fabrication plant" means a plant to manufacture fuel elements or other components containing *nuclear material* and includes the plant's storage and analytical sections.

APPENDIX 3

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, May 1971)

The Board of Governors has requested the Director General to use the material reproduced in this document as the basis for negotiating safeguards agreements between the Agency and non-nuclear weapon States party to the Treaty on the Non-Proliferation of Nuclear Weapons.

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PART I

BASIC UNDERTAKING

1. The Agreement should contain, in accordance with Article III.1 of the Treaty on the Non-Proliferation of Nuclear Weapons[1], an undertaking by the State to accept safeguards, in accordance with the terms of the Agreement, 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.

APPLICATION OF SAFEGUARDS

2. The Agreement should provide for the Agency's right and obligation to ensure that safeguards will be applied, in accordance with the terms of the Agreement, on all source or special fissionalbe material in all peaceful nuclear activities within the territory of the State, 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.

CO-OPERATION BETWEEN THE AGENCY AND THE STATE

3. The Agreement should provide that the Agency and the State shall co-operate to facilitate the implementation of the safeguards provided for therein.

IMPLEMENTATION OF SAFEGUARDS

4. The Agreement should provide that safeguards shall be implemented in a manner designed:

(a) To avoid hampering the economic and technological development of the State or international co-operation in the field of peaceful nuclear activities, including international exchange of *nuclear material*;[2]

(b) To avoid undue interference in the State's peaceful nuclear activities, and in particular in the operation of *facilities;* and

(c) To be consistent with prudent management practices required for the economic and safe conduct of nuclear activities.

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[1] Reproduced in document INFCIRC/140.

[2] Terms in italics have a specialized meaning, which is defined in paragraphs 98-116 below.

5. The Agreement should provide that the Agency shall take every precaution to protect commercial and industrial secrets and other confidential information coming to its knowledge in the implementation of the Agreement. The Agency shall not publish or communicate to any State, organization or person any information obtained by it in connection with the implementation of the Agreement, except that specific information relating to such implementation in the State may be given to the Board of Governors and to such Agency staff members as require such knowledge by reason of their official duties in connection with safeguards, but only to the extent necessary for the Agency to fulfill its responsibilities in implementing the Agreement. Summarized information on *nuclear material* being safeguarded by the Agency under the Agreement may be published upon decision of the Board if the States directly concerned agree.

6. The Agreement should provide that in implementing safeguards pursuant thereto the Agency shall take full account of technological developments in the field of safeguards, and shall make every effort to ensure optimum cost-effectiveness and the application of the principle of safeguarding effectively the flow of *nuclear material* subject to safeguards under the Agreement by use of instruments and other techniques at certain *strategic points* to the extent that present or future technology permits. In order to ensure optimum cost-effectiveness, use should be made, for example, of such means as:

(a) Containment as a means of defining *material balance areas* for accounting purposes;

(b) Statistical techniques and random sampling in evaluating the flow of *nuclear material*; and

(c) Concentration of verification procedures on those stages in the nuclear fuel cycle involving the production, processing, use or storage of *nuclear material* from which nuclear weapons or other nuclear explosive devices could readily be made, and minimization of verification procedures in respect of other *nuclear material*, on condition that this does not hamper the Agency in applying safeguards under the Agreement.

NATIONAL SYSTEM OF ACCOUNTING FOR AND CONTROL OF NUCLEAR MATERIAL

7. The Agreement should provide that the State shall establish and maintain a system of accounting for and control of all *nuclear material* subject to safeguards under the Agreement, and that such safeguards shall be applied in such a manner as to enable the Agency to verify, in ascertaining that there has been no diversion of *nuclear material* from peaceful uses to nuclear weapons or other nuclear explosive devices, findings of the State's system. The Agency's verification shall include, inter alia, independent measurements and observations conducted by the Agency in accordance with the procedures specified in Part II below. The Agency, in its verification, shall take due account of the technical effectiveness of the State's system.

PROVISION OF INFORMATION TO THE AGENCY

8. The Agreement should provide that to ensure the effective implementation of safeguards thereunder the Agency shall be provided, in accordance with the provisions set out in Part II below, with information concerning *nuclear material* subject to safeguards under the Agreement and the features of *facilities* relevant to safeguarding such material. The Agency shall require only the minimum amount of information and data consistent with carrying out its responsibilities under the Agreement. Information pertaining to *facilities* shall be the minimum necessary for safeguarding *nuclear material* subject to safeguards under the Agreement. In examining design information, the Agency shall, at the request of the State, be prepared to examine on premises of the State design information which the State regards as being of particular sensitivity. Such information would not have to be physically transmitted to the Agency provided that it remained available for ready further examination by the Agency on premises of the State.

AGENCY INSPECTORS

9. The Agreement should provide that the State shall take the necessary steps to ensure that Agency inspectors can effectively discharge their functions under the Agreement. The Agency shall secure the consent of the State to the designation of Agency inspectors to that State. If the State, either upon proposal of a designation or at any other time after a designation has been made, objects to the designation, the Agency shall propose to the State an alternative designation or designations. The repeated refusal of a State to accept the designation of Agency inspectors which would impede the inspections conducted under the Agreement would be considered by the Board upon referral by the Director General with a view to appropriate action. The visits and activities of Agency inspectors shall be so arranged as to reduce to a minimum the possible inconvenience and disturbance to the State and to the peaceful nuclear activities inspected, as well as to ensure protection of industrial secrets or any other confidential information coming to the inspectors' knowledge.

PRIVILEGES AND IMMUNITIES

10. The Agreement should specify the privileges and immunities which shall be granted to the Agency and its staff in respect of their functions under the Agreement. In the case of a State party to the Agreement on the Privileges and Immunities of the Agency,[3] the provisions thereof, as in force for such State, shall apply. In the case of other States, the privileges and immunities granted should

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[3] Reproduced in document INFCIRC/9/Rev.2.

be such as to ensure that:

(a) The Agency and its staff will be in a position to discharge their functions under the Agreement effectively; and

(b) No such State will be placed thereby in a more favourable position than States party to the Agreement on the Privileges and Immunities of the Agency.

TERMINATION OF SAFEGUARDS

Consumption or dilution of nuclear material

11. The Agreement should provide that safeguards shall terminate on *nuclear material* subject to safeguards thereunder upon determination by the Agency that it has been consumed, or has been diluted in such a way that it is no longer usable for any nuclear activity relevant from the point of view of safeguards, or has become practicably irrecoverable.

Transfer of nuclear material out of the State

12. The Agreement should provide, with respect to *nuclear material* subject to safeguards thereunder, for notification of transfers of such material out of the State, in accordance with the provisions set out in paragraphs 92-94 below. The Agency shall terminate safeguards under the Agreement on *nuclear material* when the recipient State has assumed responsibility therefor, as provided for in paragraph 91. The Agency shall maintain records indicating each transfer and, where applicable, the re-application of safeguards to the transferred *nuclear material*.

Provisions relating to nuclear material to be used in non-nuclear activities

13. The Agreement should provide that if the State wishes to use *nuclear material* subject to safeguards thereunder in non-nuclear activities, such as the production of alloys or ceramics, it shall agree with the Agency on the circumstances under which the safeguards on such *nuclear material* may be terminated.

NON-APPLICATION OF SAFEGUARDS TO NUCLEAR MATERIAL TO BE USED IN NON-PEACEFUL ACTIVITIES

14. The Agreement should provide that if the State intends to exercise its discretion to use *nuclear material* which is required to be safeguarded thereunder in a nuclear activity which does not require the application of safeguards under the Agreement, the following procedures will apply:

(a) The State shall inform the Agency of the activity, making it clear:

(i) That the use of the *nuclear material* in a

non-proscribed military activity will not be in conflict with an undertaking the State may have given and in respect of which Agency safeguards apply, that the *nuclear material* will be used only in a peaceful nuclear activity; and

(ii) That during the period of non-application of safeguards the *nuclear material* will not be used for the production of nuclear weapons or other nuclear explosive devices;

(b) That State and the Agency shall make an arrangement so that, only while the *nuclear material* is in such an activity, the safeguards provided for in the Agreement will not be applied. The arrangement shall identify, to the extent possible, the period or circumstances during which safeguards will not be applied. In any event, the safeguards provided for in the Agreement shall again apply as soon as the *nuclear material* is reintroduced into a peaceful nuclear activity. The Agency shall be kept informed of the total quantity and composition of such unsafeguarded *nuclear material* in the State and of any exports of such material; and

(c) Each arrangement shall be made in agreement with the Agency. The Agency's agreement shall be given as promptly as possible; it shall only relate to the temporal and procedural provisions, reporting arrangements, etc., but shall not involve any approval or classified knowledge of the military activity or relate to the use of the *nuclear material* therein.

FINANCE

15. The Agreement should contain one of the following sets of provisions:

(a) An agreement with a Member of the Agency should provide that each party thereto shall bear the expenses it incurs in implementing its responsibilities thereunder. However, if the State or persons under its jurisdiction incur extraordinary expenses as a result of a specific request by the Agency, the Agency shall reimburse such expenses provided that it has agreed in advance to do so. In any case the Agency shall bear the cost of any additional measuring or sampling which inspectors may request; or

(b) An agreement with a party not a Member of the Agency should in application of the provisions of Article XIV.C of the Statute, provide that the party shall reimburse fully to the Agency the safeguards expenses the Agency incurs thereunder. However, if the party or persons under its jurisdiction incur extraordinary expenses as a result of a specific request by the Agency, the Agency shall reimburse such expenses provided that it has agreed in advance to do so.

THIRD PARTY LIABILITY FOR NUCLEAR DAMAGE

16. The Agreement should provide that the State shall ensure that any protection against third party liability in respect of nuclear damage, including any insurance or other financial security, which may be available under its laws or regulations shall apply to the Agency and its officials for the purpose of the implementation of the Agreement, in the same way as that protection applies to nationals of the State.

INTERNATIONAL RESPONSIBILITY

17. The Agreement should provide that any claim by one party thereto against the other in respect of any damage, other than damage arising out of a nuclear incident, resulting from the implementation of safeguards under the Agreement, shall be settled in accordance with international law.

MEASURES IN RELATION TO VERIFICATION OF NON-DIVERSION

18. The Agreement should provide that if the Board, upon report of the Director General, decides that an action by the State is essential and urgent in order to ensure verification that *nuclear material* subject to safeguards under the Agreement is not diverted to nuclear weapons or other nuclear explosive devices the Board shall be able to call upon the State to take the required action without delay, irrespective of whether procedures for the settlement of a dispute have been invoked.

19. The Agreement should provide that if the Board upon examination of relevant information reported to it by the Director General finds that the Agency is not able to verify that there has been no diversion of *nuclear material* required to be safeguarded under the Agreement to nuclear weapons or other nuclear explosive devices, it may make the reports provided for in paragraph C of Article XII of the Statute and may also take, where applicable, the other measures provided for in that paragraph. In taking such action the Board shall take account of the degree of assurance provided by the safeguards measures that have been applied and shall afford the State every reasonable opportunity to furnish the Board with any necessary reassurance.

INTERPRETATION AND APPLICATION OF THE AGREEMENT AND SETTLEMENT OF DISPUTES

20. The Agreement should provide that the parties thereto shall, at the request of either, consult about any question arising out of the interpretation or application thereof.

21. The Agreement should provide that the State shall have the right to request that any question arising out of the interpretation or application thereof be considered by the Board; and that the State shall be invited by the Board to participate in the discussion of

any such question by the Board.

22. The Agreement should provide that any dispute arising out of the interpretation or application thereof except a dispute with regard to a finding by the Board under paragraph 19 above or an action taken by the Board pursuant to such a finding which is not settled by negotiation or another procedure agreed to by the parties should, on the request of either party, be submitted to an arbitral tribunal composed as follows: each party would designate one arbitrator, and the two arbitrators so designated would elect a third, who would be the Chairman. If, within 30 days of the request for arbitration, either party has not designated an arbitrator, either party to the dispute may request the President of the International Court of Justice to appoint an arbitrator. The same procedure would apply if, within 30 days of the designation or appointment of the second arbitrator, the third arbitrator had not been elected. A majority of the members of the arbitral tribunal would constitute a quorum, and all decisions would require the concurrence of two arbitrators. The arbitral procedure would be fixed by the tribunal. The decisions of the tribunal would be binding on both parties.

FINAL CLAUSES

Amendment of the Agreement

23. The Agreement should provide that the parties thereto shall, at the request of either of them, consult each other on amendment of the Agreement. All amendments shall require the agreement of both parties. It might additionally be provided, if convenient to the State, that the agreement of the parties on amendments to Part II of the Agreement could be achieved by recourse to a simplified procedure. The Director General shall promptly inform all Member States of any amendment to the Agreement.

Suspension of application of Agency safeguards under other agreements

24. Where applicable and where the State desires such a provision to appear, the Agreement should provide that the application of Agency safeguards in the State under other safeguards agreements with the Agency shall be suspended while the Agreement is in force. If the State has received assistance from the Agency for a project, the State's undertaking in the Project Agreement not to use items subject thereto in such a way as to further any military purpose shall continue to apply.

Entry into force and duration

25. The Agreement should provide that it shall enter into force on the date on which the Agency recieves from the State written notification that the statutory and constitutional requirements for entry into force have been met. The Director General shall promptly inform all Member States of the entry into force.

26. The Agreement should provide for it to remain in force as long at the State is party to the Treaty on the Non-Proliferation of Nuclear Weapons.[1]

PART II

INTRODUCTION

27. The Agreement should provide that the the purpose of Part II thereof is to specify the procedures to be applied for the implementation of the safeguards provisions of Part I.

OBJECTIVE OF SAFEGUARDS

28. The Agreement should provide that the objective of safeguards is the timely detection of diversion of significant quantities of *nuclear material* from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosives devices or for purposes unknown, and deterrence of such diversion by the risk of early detection.

29. To this end the Agreement should provide for the use of material accountancy as a safeguards measure of fundamental importance, with containment and surveillance as important complementary measures.

30. The Agreement should provide that the technical conclusion of the Agency's verification activities shall be a statement, in respect of each *material balance area*, of the amount of *material unaccounted for* over a specific period, giving the limits of accuracy of the amounts stated.

NATIONAL SYSTEM OF ACCOUNTING FOR AND CONTROL OF NUCLEAR MATERIAL

31. The Agreement should provide that pursuant to paragraph 7 above the Agency, in carrying out its verification activities, shall make full use of the State's system of accounting for and control of all *nuclear material* subject to safeguards under the Agreement, and shall avoid unnecessary duplication of the State's accounting and control activities.

32. The Agreement should provide that the State's system of accounting for and control of all *nuclear material* subject to safeguards under the Agreement shall be based on a structure of material balance areas, and shall make provision as appropriate and specified in the Subsidiary Arrangements for the establishment of such measures as:

(a) A measurement system for the determination of the quantities of *nuclear material* received, produced, shipped, lost or otherwise removed from inventory, and the quantities on inventory;

(b) The evaluation of precision and accuracy of measurements and the estimation of measurement uncertainty;

(c) Procedures for identifying, reviewing and evaluating differences in shipper/receiver measurements;

(d) Procedures for taking a *physical inventory;*

(e) Procedures for the evaluation of accumulations of unmeasured inventory and unmeasured losses;

(f) A system of records and reports showing, for each *material balance area*, the inventory of *nuclear material* and the changes in that inventory including receipts into and transfers out of the *material balance area;*

(g) Provisions to ensure that the accounting procedures and arrangements are being operated correctly; and

(h) Procedures for the submission of reports to the Agency in accordance with paragraphs 59-69 below.

STARTING POINT OF SAFEGUARDS

33. The Agreement should provide that safeguards shall not apply thereunder to material in mining or ore processing activities.

34. The Agreement should provide that:

(a) When any material containing uranium or thorium which has not reached the stage of the nuclear fuel cycle described in sub-paragraph (c) below is directly or indirectly exported to a non-nuclear-weapon State, the State shall inform the Agency of its quantity, composition and destination, unless the material is exported for specifically non-nuclear purposes;

(b) When any material containing uranium or thorium which has not reached the stage of the nuclear fuel cycle described in sub-paragraph (c) below is imported, the State shall inform the Agency of its quantity and composition, unless the material is imported for specifically non-nuclear purposes; and

(c) When any *nuclear material* of a composition and purity suitable for fuel fabrication or for being isotopically enriched leaves the plant or the process stage in which it has been produced, or when such *nuclear material*, or any other *nuclear material* produced at a later stage in the nuclear fuel cycle, is imported into the State, the *nuclear material* shall become subject to the other safeguards procedures specified in the Agreement.

TERMINATION OF SAFEGUARDS

35. The Agreement should provide that safeguards shall terminate on *nuclear material* subject to safeguards thereunder under the conditions set forth in paragraph 11 above. Where the conditions of that paragraph are not met, but the State considers that the recovery of safeguarded *nuclear material* from residues is not for the time being practicable or desirable, the Agency and the State shall consult on the appropriate safeguards measures to be applied. It should further be provided that safeguards shall terminate on *nuclear material* subject to safeguards under the Agreement under the conditions set forth in paragraph 13 above, provided that the State

and the Agency agree that such *nuclear material* is practicably irrecoverable.

EXEMPTIONS FROM SAFEGUARDS

36. The Agreement should provide that the Agency shall, at the request of the State, exempt *nuclear material* from safeguards, as follows:

(a) Special fissionable material, when it is used in gram quantities or less as a sensing component in instruments;

(b) *Nuclear material*, when it is used in non-nuclear activities in accordance with paragraph 13 above, if such *nuclear material* is recoverable; and

(c) Plutonium with an isotopic concentration of plutonium-238 exceeding 80%.

37. The Agreement should provide that *nuclear material* that would otherwise be subject to safeguards shall be exempted from safeguards at the request of the State, provided that *nuclear material* so exempted in the State may not at any time exceed:

(a) One kilogram in total of special fissionable material, which may consist of one of more of the following:

(i) Plutonium;

(ii) Uranium with an *enrichment* of 0.2 (20%) and above, taken account of by multiplying its weight by its *enrichment;* and

(iii) Uranium with an *enrichment* below 0.2 (20%) and above that of natural uranium, taken account of by multiplying its weight by five times the square of its *enrichment;*

(b) Ten metric tons in total of natural uranium and depleted uranium with an *enrichment* above 0.005 (0.5%);

(c) Twenty metric tons of depleted uranium with an *enrichment* above 0.005 (0.5%) or below; and

(d) Twenty metric tons of thorium;

or such greater amounts as may be specified by the Board of Governors for uniform application.

38. The Agreement should provide that if exempted *nuclear material* is to be processed or stored together with safeguarded *nuclear material*, provision should be made for the re-application of safeguards thereto.

SUBSIDIARY ARRANGEMENTS

39. The Agreement should provide that the Agency and the State shall make Subsidiary Arrangements which shall specify in detail, to the extent necessary to permit the Agency to fulfill its responsibilities under the Agreement in an effective and efficient manner, how the procedures laid down in the Agreement are to be applied. Provision should be made for the possibility of an extension or change of the Subsidiary Arrangements by agreement between the Agency and the

State without amendment of the Agreement.

40. It should be provided that the Subsidiary Arrangements shall enter into force at the same time as, or as soon as possible after, the entry into force of the Agreement. The State and the Agency shall make every effort to achieve their entry into force within 90 days of the entry into force of the Agreement, a later date being acceptable only with the agreement of both parties. The State shall provide the Agency promptly with the information required for completing the Subsidiary Arrangements. The Agreement should also provide that, upon its entry into force, the Agency shall be entitled to apply the procedures laid down therein in respect of the *nuclear material* listed in the inventory provided for in paragraph 41 below.

INVENTORY

41. The Agreement should provide that, on the basis on the initial report referred to in paragraph 62 below, the Agency shall establish a unified inventory of all *nuclear material* in the State subject to safeguards under the Agreement, irrespective of its origin, and maintain this inventory on the basis of subsequent reports and of the results of its verification activities. Copies of the inventory shall be made available to the State at agreed intervals.

DESIGN INFORMATION

General

42. Pursuant to paragraph 8 above, the Agreement should stipulate that design information in respect of existing *facilities* shall be provided to the Agency during the discussion of the Subsidiary Arrangements, and that the time limits for the provision of such information in respect of new *facilities* shall be specified in the Subsidiary Arrangements. It should further be stipulated that such information shall be provided as early as possible before *nuclear material* is introduced into a new *facility*.

43. The Agreement should specify that the design information in respect of each *facility* to be made available to the Agency shall include, when applicable:

(a) Identification of the *facility*, stating its general character, purpose, nominal capacity and geographic location, and the name and address to be used for routine business purposes;

(b) Description of the general arrangement of the *facility* with reference, to the extent feasible, to the form, location and flow of *nuclear material* and to the general layout of important items of equipment which use, produce or process *nuclear material*;

(c) Description of features of the *facility* relating to material accountancy, containment and surveillance; and

(d) Description of the existing and proposed

procedures at the *facility* for *nuclear material* accountancy and control, with special reference to *material balance areas* established by the operator, measurements of flow and procedures for *physical inventory* taking.

44. The Agreement should further provide that other information relevant to the application of safeguards shall be made available to the Agency in respect of each *facility*, in particular on organizational responsibility for material accountancy and control. It should also be provided that the State shall make available to the Agency supplementary information on the health and safety procedures which the Agency shall observe and with which the inspectors shall comply at the *facility*.

45. The Agreement should stipulate that design information in respect of a modification relevant for safeguards purposes shall be provided for examination sufficiently in advance for the safeguards procedures to be adjusted when necessary.

Purposes of examination of design information

46. The Agreement should provide that the design information made available to the Agency shall be used for the following purposes:

(a) To identify the features of *facilities* and *nuclear material* relevant to the application of safeguards to *nuclear material* in sufficient detail to facilitate verification;

(b) To determine *material balance areas* to be used for Agency accounting purposes and to select those *strategic points* which are *key measurement points* and which will be used to determine the *nuclear material* flows and inventories; in determining such *material balance areas* the Agency shall, inter alia, use the following criteria:

(i) The size of the *material balance area* should be related to the accuracy with which the material balance can be established;

(ii) In determining the *material balance area* advantage should be taken of any opportunity to use containment and surveillance to help ensure the completeness of flow measurements and thereby simplify the application of safeguards and concentrate measurement efforts at *key measurement points;*

(iii) A number of *material balance areas* in use at a *facility* or at distinct sites may be combined in one *material balance area* to be used for Agency accounting purposes when the Agency determines that this is consistent with its verification requirements; and

(iv) If the State so requests, a special *material balance area* around a process step involving commercially sensitive information may be established;

(c) To establish the nominal timing and procedures for

taking of *physical inventory* for Agency accounting purposes;

(d) To establish the records and reports requirements and records evaluation procedures;

(e) To establish requirements and procedures for verification of the quantity and location of *nuclear material;* and

(f) To select appropriate combinations of containment and surveillance methods and techniques and the *strategic points* which they are to be applied.

It should further be provided that the results of the examination of the design information shall be included in the Subsidiary Arrangements.

Re-examination of design information

47. The Agreement should provide that design information shall be reexamined in the light of changes in operating conditions, of developments in safeguards technology or of experience in the application of verification procedures, with a view to modifying the action the Agency has taken pursuant to paragraph 46 above.

Verification of design information

48. The Agreement should provide that the Agency, in co-operation with the State, may send inspectors to *facilities* to verify the design information provided to the Agency pursuant to paragraphs 42-45 above for the purposes stated in paragraph 46.

INFORMATION IN RESPECT OF NUCLEAR MATERIAL OUTSIDE FACILITIES

49. The Agreement should provide that the following information concerning *nuclear material* customarily used outside *facilities* shall be provided as applicable to the Agency:

(a) General description of the use of the *nuclear material,* its geographic location, and the user's name and address for routine business purposes; and

(b) General descriptions of the existing and proposed procedures for *nuclear material* accountancy and control.

The Agreement should further provide that the Agency shall be informed on a timely basis of any change in the information provided to it under this paragraph.

50. The Agreement should provide that the information made available to the Agency in respect of *nuclear material* customarily used outside *facilities* may be used, to the extent relevant, for the purposes set out in sub-paragraphs 46(b) - (f) above.

RECORDS SYSTEM

General

51. The Agreement should provide that in establishing a national system of accounting for and control of *nuclear material* as referred to in paragraph 7 above, the State shall arrange that records are kept in respect of each *material balance area*. Provision should also be made that the Subsidiary Arrangements shall describe the records to be kept in respect of each *material balance area*.

52. The Agreement should provide that the State shall make arrangements to facilitate the examination of records by inspectors, particularly, if the records are not kept in English, French, Russian or Spanish.

53. The Agreement should provide that the records shall be retained for at least five years.

54. The Agreement should provide that the records shall consist, as appropriate, of:

(a) Accounting records of all *nuclear material* subject to safeguards under the Agreement; and

(b) Operating records for *facilities* containing such *nuclear material*.

55. The Agreement should provide that the system of measurements on which the records used for the preparation of reports are based shall either conform to the latest international standards or be equivalent in quality to such standards.

Accounting records

56. The Agreement should provide that the accounting records shall set forth the following in respect of each *material balance area*:

(a) All *inventory changes*, so as to permit a determination of the *book inventory* at any time;

(b) All measurement results that are used for determination of the *physical inventory*; and

(c) All *adjustments* and *corrections* that have been made in respect of *inventory changes*, *book inventories* and *physical inventories*.

57. The Agreement should provide that for all *inventory changes* and *physical inventories* the records shall show, in respect of each *batch* of *nuclear material*: material identification, *batch data* and *source data*. Provision should further be included that records shall account for uranium, thorium and plutonium separately in each *batch* of *nuclear material*. Furthermore, the date of the *inventory change* and, when appropriate, the originating *material balance area* and the receiving *material balance area* or the recipient, shall be indicated for each *inventory change*.

Operating records

58. The Agreement should provide that the operating records shall set forth as appropriate in respect of each *material balance area*:

(a) Those operating data which are used to establish

changes in the quantities and composition of *nuclear material*;
(b) The data obtained from the calibration of tanks and instruments and from sampling and analyses, the procedures to control the quality of measurements and the derived estimates of random and systematic error;
(c) The description of the sequence of the actions taken in preparing for, and in taking a *physical inventory*, in order to ensure that it is correct and complete; and
(d) The description of the actions taken in order to ascertain the cause and magnitude of any accidental or unmeasured loss that might occur.

REPORTS SYSTEM

General

59. The Agreement should specify that the State shall provide the Agency with reports as detailed in paragraphs 60-69 below in respect of *nuclear material* subject to safeguards thereunder.
60. The Agreement should provide that reports shall be made in English, French, Russian or Spanish, except as otherwise specified in the Subsidiary Arangements.
61. The Agreement should provide that reports shall be based on the records kept in accordance with paragraphs 51-58 above and shall consist, as appropriate, of accounting reports and special reports.

Accounting reports

62. The Agreement should stipulate that the Agency shall be provided with an initial report on all *nuclear material* which is to be subject to safeguards thereunder. It should also be provided that the initial report shall be dispatched by the State to the Agency within 30 days of the last day of the calendar month in which the Agreement enters into force, and shall reflect the situation as of the last day of that month.
63. The Agreement should stipulate that for each *material balance area* the State shall provide the Agency with the following accounting reports:
(a) *Inventory change* reports showing changes in the inventory of *nuclear material*. The reports shall be dispatched as soon as possible and in any event within 30 days after the end of the month in which the *inventory changes* occurred or were established; and
(b) Material balance reports showing the material balance based on a *physical inventory* of *nuclear material* actually present in the *material balance area*. The reports shall be dispatched as soon as possible and in any event within 30 days after the *physical inventory* has been taken.

The reports shall be based on data available as of the date of reporting and may be corrected at a later date as required.

64. The Agreement should provide that *inventory change* reports shall specify identification and *batch data* for each *batch* of *nuclear material*, the date of the *inventory change* and, as appropriate, the originating *material balance area* and the receiving *material balance area* or the recipient. These reports shall be accompanied by concise notes:

(a) Explaining the *inventory changes*, on the basis of the operating data contained in the operating records provided for under sub-paragraph 58(a) above; and

(b) Describing, as specified in the Subsidiary Arrangements, the anticipated operational programme, particularly the taking of a *physical inventory*.

65. The Agreement should provide that the State shall report each *inventory change*, *adjustment* and *correction* either periodically in a consolidated list or individually. The *inventory changes* shall be reported in terms of *batches;* small amounts, such as analytical samples, as specified in the Subsidiary Arrangement, may be combined and reported as one *inventory change*.

66. The Agreement should stipulate that the Agency shall provide the State with semi-annual statements of *book inventory* of *nuclear material* subject to safeguards, for each *material balance area* as based on the *inventory change* reports for the period covered by each such statement.

67. The Agreement should specify that the material balance reports shall include the following entries, unless otherwise agreed by the Agency and the State:

(a) Beginning *physical inventory;*
(b) *Inventory changes* (first increases, then decreases);
(c) Ending *book inventory;*
(d) *Shipper/receiver differences;*
(e) Adjusted ending *book inventory;*
(f) Ending *physical inventory;* and
(g) *Material unaccounted for.*

A statement of the *physical inventory*, listing all *batches* separately and specifying material identification and *batch data* for each *batch* shall be attached to each material balance report.

Special reports

68. The Agreement should provide that the State shall make special reports without delay:

(a) If any unusual incident or circumstances lead the State to believe that there is or may have been loss of *nuclear material* that exceeds the limits to be specified for this purpose in the Subsidiary Arrangements; or

(b) If the containment has unexpectedly changed from that specified in the Subsidiary Arrangements to the extent that unauthorized removal of *nuclear material* has become possible.

Amplification and clarification of reports

69. The Agreement should provide that at the Agency's request the State shall supply amplifications or clarifications of any report, in so far as relevant for the purpose of safeguards.

INSPECTIONS

General

70. The Agreement should stipulate that the Agency shall have the right to make inspections as provided for in paragraphs 71-82 below.

Purposes of inspections

71. The Agreement should provide that the Agency may make ad hoc inspections in order to:

(a) Verify the information contained in the initial report on the *nuclear material* subject to safeguards under the Agreement;

(b) Identify and verify changes in the situation which have occurred since the date of the initial report; and

(c) Identify, and if possible verify the quantity and composition of, *nuclear material* in accordance with paragraphs 93 and 96 below, before its transfer out of or upon its transfer into the State.

72. The Agreement should provide that the Agency may make routine inspections in order to:

(a) Verify that reports are consistent with records;

(b) Verify the location, identity, quantity and composition of all *nuclear material* subject to safeguards under the Agreement; and

(c) Verify information on the possible causes of *material unaccounted for, shipper/receiver differences* and uncertainties in the *book inventory*.

73. The Agreement should provide that the Agency may make special inspections subject to the procedures laid down in paragraph 77 below:

(a) In order to verify the information contained in special reports; or

(b) If the Agency considers that information made available by the State, including explanations from the State and information obtained from routine inspections, is not adequate for the Agency to fulfill its responsibilities under the Agreement.

An inspection shall be deemed to be special when it is either additional to the routine inspection effort provided for in paragraphs 78-82 below, or involves access to information or locations in addition to the access specified in paragraph 76 for ad hoc and routine inspections, or both.

Scope of inspections

74. The Agreement should provide that for the purposes stated in paragraphs 71-73 above the Agency may:

(a) Examine the records kept pursuant to paragraphs 51-58;

(b) Make independent measurements of all *nuclear material* subject to safeguards under the Agreement;

(c) Verify the functioning and calibration of instruments and other measuring and control equipment;

(d) Apply and make use of surveillance and containment measures; and

(e) Use other objective methods which have been demonstrated to be technically feasible.

75. It should further be provided that within the scope of paragraph 74 above the Agency shall be enabled:

(a) To observe that samples at *key measurement points* for material balance accounting are taken in accordance with procedures which produce representative samples, to observe the treatment and analysis of the samples and to obtain duplicates of such samples;

(b) To observe that the measurements of *nuclear material* at *key measurement points* for material balance accounting are representative, and to observe the calibration of the instruments and equipment involved;

(c) To make arrangements with the State that, if necessary:

(i) Additional measurements are made and additional samples taken for the Agency's use;

(ii) The Agency's standard analytical samples are analysed;

(iii) Appropriate absolute standards are used in calibrating instruments and other equipment; and

(iv) Other calibrations are carried out;

(d) To arrange to use its own equipment for independent measurement and surveillance, and if so agreed and specified in the Subsidiary Arrangements, to arrange to install such equipment;

(e) To apply its seals and other identifying and tamper-indicating devices to containments, if so agreed and specified in the Subsidiary Arrangements; and

(f) To make arrangements with the State for the shipping of samples taken for the Agency's use.

Access for inspections

76. The Agreement should provide that:

(a) For the purposes specified in sub-paragraphs 71(a)

and (b) above and until such time as the *strategic points* have been specified in the Subsidiary Arrangements, the Agency's inspectors shall have access to any location where the initial report or any inspections carried out in connection with it indicate that *nuclear material* is present;
(b) For the purposes specified in sub-paragraph 71(c) above the inspectors shall have access to any location of which the Agency has been notified in accordance with sub-paragraphs 92(c) or 95(c) below;
(c) For the purposes specified in paragraph 72 above the Agency's inspectors shall have access only to the *strategic points* specified in the Subsidiary Arrangements and to the records maintained pursuant to paragraphs 51-58; and
(d) In the event of the State concluding that any unusual circumstances require extended limitations on access by the Agency, the State and the Agency shall promptly make arrangements with a view to enabling the Agency to discharge its safeguards responsibilities in the light of these limitations. The Director General shall report each such arrangement to the Board.

77. The Agreement should provide that in circumstances which may lead to special inspections for the purposes specified in paragraph 73 above the State and the Agency shall consult forthwith. As a result of such consultations the Agency may make inspections in addition to the routine inspection effort provided for in paragraphs 78-82 below, and may obtain access in agreement with the State to information or locations in addition to the access specified in paragraph 76 above for ad hoc and routine inspections. Any disagreement concerning the need for additional access shall be resolved in accordance with paragraphs 21 and 22; in case action by the State is essential and urgent, paragraph 18 above shall apply.

Frequency and intensity of routine inspections

78. The Agreement should provide that the number, intensity, duration and timing of routine inspections shall be kept to the minimum consistent with the effective implementation of the safeguards procedures set forth therein, and that the Agency shall make the optimum and most economical use of available inspection resources.
79. The Agreement should provide that in the case of *facilities* and *material balance areas* outside *facilities* with a content or *annual throughput*, whichever is greater, of *nuclear material* not exceeding five *effective kilograms*, routine inspections shall not exceed one per year. For other *facilities* the number, intensity, duration, timing and mode of inspections shall be determined on the basis that in the maximum or limiting case the inspection regime shall be no more intensive than is necessary and sufficient to maintain continuity of knowledge of the flow and inventory of *nuclear material*.
80. The Agreement should provide that the maximum routine inspection effort in respect of *facilities* with a content or *annual throughput*

of *nuclear material* exceeding five *effective kilograms* shall be determined as follows:

(a) For reactors and sealed stores, the maximum total of routine inspection per year shall be determined by allowing one sixth of a *man-year of inspection* for each such *facility* in the State;

(b) For other *facilities* involving plutonium or uranium enriched to more than 5%, the maximum total of routine inspection per year shall be determined by allowing for each such *facility* 30 X $\sqrt{E}$ man-days of inspection per year, where E is the inventory or *annual throughput* of *nuclear material*, whichever is greater, expressed in *effective kilograms*. The maximum established for any such *facility* shall not, however, be less than 1.5 *man-years of inspection;* and

(c) For all other *facilities*, the maximum total of routine inspection per year shall be determined by allowing for each such *facility* one third of a *man-year of inspection* plus 0.4 X E man-days of inspection per year, where E is the inventory or *annual throughput* of *nuclear material*, whichever is greater, expressed in *effective kilograms*.

The Agreement should further provide that the Agency and the State may agree to amend the maximum figures specified in this paragraph upon determination by the Board that such amendment is reasonable.

81. Subject to paragraphs 78-80 above the criteria to be used for determining the actual number, intensity, duration, timing and mode of routine inspections of any *facility* shall include:

(a) The form of *nuclear material*, in particular, whether the material is in bulk form or contained in a number of separate items; its chemical composition and, in the case of uranium, whether it is of low or high *enrichment;* and its accessibility;

(b) The effectiveness of the State's accounting and control system, including the extent to which the operators of *facilities* are functionally independent of the State's accounting and control system; the extent to which the measures specified in paragraph 32 above have been implemented by the State; the promptness of reports submitted to the Agency; their consistency with the Agency's independent verification; and the amount and accuracy of the *material unaccounted for*, as verified by the Agency;

(c) Characteristics of the State's nuclear fuel cycle, in particular, the number and types of *facilities* containing *nuclear material* subject to safeguards, the characteristics of such *facilities* relevant to safeguards, notably the degree of containment; the extent to which the design of such *facilities* facilitates verification of the flow and inventory of *nuclear material;* and the extent to which information from different *material balance*

areas can be correlated;

(d) International interdependence, in particular, the extent to which *nuclear material* is received from or sent to other States for use or processing; any verification activity by the Agency in connection therewith; and the extent to which the State's nuclear activities are interrelated with those of other States; and

(e) Technical developments in the field of safeguards, including the use of statistical techniques and random sampling in evaluating the flow of *nuclear material*.

82. The Agreement should provide for consultation between the Agency and the State if the latter considers that the inspection effort is being deployed with undue concentration on particular *facilities*.

Notice of inspections

83. The Agreement should provide that the Agency shall give advance notice to the State before arrival of inspectors at *facilities* or *material balance areas* outside *facilities*, as follows:

(a) For ad hoc inspections pursuant to sub-paragraph 71(c) above, at least 24 hours, for those pursuant to sub-paragraphs 71(a) and (b), as well as the activities provided for in paragraph 48, at least one week;

(b) For special inspections pursuant to paragraph 73 above, as promptly as possible after the Agency and the State have consulted as provided for in paragraph 77, it being understood that notification of arrival normally will constitute part of the consultations; and

(c) For routine inspections pursuant to paragraph 72 above, at least 24 hours in respect of the *facilities* referred to in sub-paragraph 80(b) and sealed stores containing plutonium or uranium enriched to more than 5%, and one week in all other cases.

Such notice of inspections shall include the names of the inspectors and shall indicate the *facilities* and the *material balance areas* outside *facilities* to be visited and the periods during which they will be visited. If the inspectors are to arrive from outside the State the Agency shall also give advance notice of the place and time of their arrival in the State.

84. However, the Agreement should also provide that, as a supplementary measure, the Agency may carry out without advance notification a portion of the routine inspections pursuant to paragraph 80 above in accordance with the principle of random sampling. In performing any unannounced inspections, the Agency shall fully take into account any operational programme provided by the State pursuant to paragraph 64(b). Moreover, whenever practicable, and on the basis of the operational programme, it shall advise the State periodically of its general programme of announced and unannounced inspections, specifying the general periods when inspections are

foreseen. In carrying out any unannounced inspections, the Agency shall make every effort to minimize any practical difficulties for *facility* operators and the State, bearing in mind the relevant provisions of paragraphs 44 above and 89 below. Similarly the State shall make every effort to facilitate the task of the inspectors.

Designation of inspectors

85. The Agreement should provide that:
(a) The Director General shall inform the State in writing of the name, qualifications, nationality, grade and such other particulars as may be relevant, of each Agency official he proposes for designation as an inspector for the State;
(b) The State shall inform the Director General within 30 days of the receipt of such a proposal whether it accepts the proposal;
(c) The Director General may designate each official who has been accepted by the State as one of the inspectors for the State, and shall inform the State of such designations; and
(d) The Director General, acting in response to a request by the State or on his own initiative, shall immediately inform the State of the withdrawal of the designation of any official as an inspector for the State.

The Agreement should also provide, however, that in respect of inspectors needed for the purposes stated in paragraph 48 above and to carry out ad hoc inspections pursuant to sub-paragraphs 71(a) and (b) the designation procedures shall be completed if possible within 30 days after the entry into force of the Agreement. If such designation appears impossible within this time limit, inspectors for such purposes shall be designated on a temporary basis.

86. The Agreement should provide that the State shall grant or renew as quickly as possible appropriate visas, where required, for each inspector designated for the State.

Conduct and visits of inspectors

87. The Agreement should provide that inspectors, in exercising their functions under paragraphs 48 and 71-75 above, shall carry out their activities in a manner designed to avoid hampering or delaying the construction, commissioning or operation of *facilities*, or affecting their safety. In particular inspectors shall not operate any *facility* themselves or direct the staff of a *facility* to carry out any operation. If inspectors consider that in pursuance of paragraphs 74 and 75, particular operations in a *facility* should be carried out by the operator, they shall make a request therefor.

88. When inspectors require services available in the State, including the use of equipment, in connection with the performance of inspections, the State shall facilitate the procurement of such services and the use of such equipment by inspectors.

89. The Agreement should provide that the State shall have the

right to have inspectors accompanied during their inspections by representatives of the State, provided that inspectors shall not thereby be delayed or otherwise impeded in the exercise of their functions.

STATEMENTS ON THE AGENCY'S VERIFICATION ACTIVITIES

90. The Agreement should provide that the Agency shall inform the State of:

(a) The results of inspections, at intervals to be specified in the Subsidiary Arrangements; and

(b) The conclusions it has drawn from its verification activities in the State, in particular by means of statements in respect of each *material balance area*, which shall be made as soon as possible after a *physical inventory* has been taken and verified by the Agency and a material balance has been struck.

INTERNATIONAL TRANSFERS

General

91. The Agreement should provide that *nuclear material* subject or required to be subject to safeguards thereunder which is transferred internationally shall, for purposes of the Agreement, be regarded as being the responsibility of the State:

(a) In the case of import, from the time that such responsibility ceases to lie with the exporting State, and no later than the time at which the *nuclear material* reaches its destination; and

(b) In the case of export, up to the time at which the recipient State assumes such responsibility, and no later than the time at which the *nuclear material* reaches its destination.

The Agreement should provide that the States concerned shall make suitable arrangements to determine the point at which the transfer of responsibility will take place. No State shall be deemed to have such responsibility for *nuclear material* merely by reason of the fact that the *nuclear material* is in transit on or over its territory or territorial waters, or that it is being transported under its flag or in its aircraft.

Transfers out of the State

92. The Agreement should provide that any intended transfer out of the State of safeguarded *nuclear material* in an amount exceeding one *effective kilogram*, or by successive shipments to the same State within a period of three months each of less than one *effective kilogram* but exceeding in total one *effective kilogram*, shall be

notified to the Agency after the conclusion of the contractual arrangements leading to the transfer and normally at least two weeks before the *nuclear material* is to be prepared for shipping. The Agency and the State may agree on different procedures for advance notification. The notification shall specify:

(a) The identification and, if possible, the expected quantity and composition of the *nuclear material* to be transferred, and the *material balance area* from which it will come;

(b) The State for which the *nuclear material* is destined;

(c) The dates on and locations at which the *nuclear material* is to be prepared for shipping;

(d) The approximate dates of dispatch and arrival of the *nuclear material;* and

(e) At what point of the transfer the recipient State will assume responsibility for the *nuclear material,* and the probable date on which this point will be reached.

93. The Agreement should further provide that the purpose of this notification shall be to enable the Agency if necessary to identify, and if possible verify the quantity and composition of, *nuclear material* subject to safeguards under the Agreement before it is transferred out of the State and, if the Agency so wishes or the State so requests, to affix seals to the *nuclear material* when it has been prepared for shipping. However, the transfer of the *nuclear material* shall not be delayed in any way by any action taken or contemplated by the Agency pursuant to this notification.

94. The Agreement should provide that, if the *nuclear material* will not be subject to Agency safeguards in the recipient State, the exporting State shall make arrangements for the Agency to recieve, within three months of the time when the recipient State accepts responsibility for the *nuclear material* from the exporting State, confirmation by the recipient State of the transfer.

Transfers into the State

95. The Agreement should provide that the expected transfer into the State of *nuclear material* required to be subject to safeguards in an amount greater than one *effective kilogram,* or by successive shipments from the same State within a period of three months each of less than one *effective kilogram* but exceeding in total one *effective kilogram,* shall be notified to the Agency as much in advance as possible of the expected arrival of the *nuclear material,* and in any case not later than the date on which the recipient State assumes responsibility therefor. The Agency and the State may agree on different procedures for advance notification. The notification shall specify:

(a) The identification and, if possible, the expected quantity and composition of the *nuclear material;*

(b) At what point of the transfer responsibility for the *nuclear material* will be assumed by the State for the purposes of the Agreement, and the

probable date on which this point will be reached; and

(c) The expected date of arrival, the location to which the *nuclear material* is to be delivered and the date on which it is intended that the *nuclear material* should be unpacked.

96. The Agreement should provide that the purpose of this notification shall be to enable the Agency if necessary to identify, and if possible verify the quantity and composition of, *nuclear material* subject to safeguards which has been transferred into the State, by means of inspection of the consignment at the time it is unpacked. However, unpacking shall not be dealyed by any action taken or contemplated by the Agency pursuant to this notification.

Special reports

97. The Agreement should provide that in the case of international transfers a special report as envisaged in paragraph 68 above shall be made if any unusual incident or circumstances lead the State to believe that there is or may have been loss of *nuclear material*, including the occurrence of significant delay during the transfer.

DEFINITIONS

98. "Adjustment" means an entry into an accounting record or a report showing a *shipper/receiver difference* or *material unaccounted for*.

99. "Annual throughput" means, for the purposes of paragraphs 79 and 80 above, the amount of *nuclear material* transferred annually out of a *facility* working at nominal capacity.

100. "Batch" means a portion of *nuclear material* handled as a unit for accounting purposes at a *key measurement point* and for which the composition and quantity are defined by a single set of specifications or measurements. The *nuclear material* may be in bulk form or contained in a number of separate items.

101. "Batch data" means the total weight of each element of *nuclear material* and, in the case of plutonium and uranium, the isotopic composition when appropriate. The units of account shall be as follows:

(a) Grams of contained plutonium;

(b) Grams of total uranium and grams of contained uranium-235 plus uranium-233 for uranium enriched in these isotopes; and

(c) Kilograms of contained thorium, natural uranium or depleted uranium.

For reporting purposes the weights of individual items in the *batch* shall be added together before rounding to the nearest unit.

102. "Book inventory" of a *material balance area* means the algebraic sum of the most recent *physical inventory* of that *material balance area* and of all *inventory changes* that have occurred since that *physical inventory* was taken.

103. "Correction" means an entry into an accounting record or a report to rectify an identified mistake or to reflect an improved

measurement of a quantity previously entered into the record or report. Each correction must identify the entry to which it pertains.

104. "Effective kilogram" means a special unit used in safeguarding *nuclear material*. The quantity in "effective kilograms" is obtained by taking:

(a) For plutonium, its weight in kilograms;

(b) For uranium with an *enrichment* of 0.01 (1%) and above, its weight in kilograms multiplied by the square of its *enrichment;*

(c) For uranium with an *enrichment* below 0.01 (1%) and above 0.005 (0.5%), its weight in kilograms multiplied by 0.0001; and

(d) For depleted uranium with an *enrichment* of 0.005 (0.5%) or below, and for thorium, its weight in kilograms multiplied by 0.00005.

105. "Enrichment" means the ratio of the combined weight of the isotopes uranium-233 and uranium-235 to that of the total uranium in question.

106. "Facility" means:

(a) A reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant or a separate storage installation; or

(b) Any location where *nuclear material* in amounts greater than one *effective kilogram is customarily used.*

107. "Inventory change" means an increase or decrease, in terms of *batches,* of *nuclear material* in a *material balance area;* such a change shall involve one of the following:

(a) Increases:

(i) Import;

(ii) Domestic receipt: receipts from other *material balance areas,* receipts from a non-safeguarded (non-peaceful) activity or receipts at the starting point of safeguards;

(iii) Nuclear production: production of special fissionable material in a reactor; and

(iv) De-exemption: reapplication of safeguards on *nuclear material* previously exempted therefrom on account of its use or quantity.

(b) Decreases:

(i) Export;

(ii) Domestic shipment: shipments to other *material balance areas* or shipments for a non-safeguarded (non-peaceful) activity;

(iii) Nuclear loss: loss of *nuclear material* due to its transformation into other element(s) or isotope(s) as a result of nuclear reactions;

(iv) Measured discard: *nuclear*

material which has been measured, or estimated on the basis of measurements, and disposed of in such a way that is not suitable for further nuclear use;

(v) Retained waste: *nuclear material* generated from processing or from an operational accident, which is deemed to be unrecoverable for the time being but which is stored;

(vi) Exemptions: exemption of *nuclear material* from safeguards on account of its use or quantity; and

(vii) Other loss: for example, accidental loss (that is, irretrievable and inadvertent loss of *nuclear material* as the result of an operational accident) or theft.

108. "Key measurement point" means a location where *nuclear material* appears in such a form that it may be measured to determine material flow or inventory. "Key measurement points" thus include, but are not limited to, the inputs and outputs (including measured discards) and storages in *material balance areas*.

109. "Man-year of inspection" means, for the purposes of paragraph 80 above, 300 man-days of inspection, a man-day being a day during which a single inspector has access to a *facility* at any time for a total of not more than eight hours.

110. "Material balance area" means an area in or outside of a *facility* such that:

(a) The quantity of *nuclear material* in each transfer into or out of each "material balance area" can be determined; and

(b) The *physical inventory* of *nuclear material* in each "material balance area" can be determined when necessary, in accordance with specified procedures,

in order that the material balance for Agency safeguards purposes can be established.

111. "Material unaccounted for" means the difference between *book inventory* and *physical inventory*.

112. "Nuclear material" means any source or any special fissionable material as defined in Article XX of the Statute. The term source material shall not be interpreted as applying to ore or ore residue. Any determination by the Board under Article XX of the Statute after the entry into force of this Agreement which adds to the materials considered to be source material or special fissionable material shall have effect under this Agreement only upon acceptance by the State.

113. "Physical inventory" means the sum of all the measured or derived estimates of *batch* quantities of *nuclear material* on hand at a given time within a *material balance area*, obtained in accordance with specified procedures.

114. "Shipper/reciver difference" means the difference between the quantity of *nuclear material* in a *batch* as stated by the shipping

material balance area and as measured at the receiving *material balance area*.

115. "Source data" means those data, recorded during measurement or calibration or used to derive empirical relationships, which identify *nuclear material* and provide *batch data*. "Source data" may include, for example, weight of compounds, conversion factors to determine weight of element, specific gravity, element concentration, isotopic ratios, relationship between volume and manometer readings and relationship between plutonium produced and power generated.

116. "Strategic point" means a location selected during examination of design information where, under normal conditions and when combined with the information from all "strategic points" taken together, the information necessary and sufficient for the implementation of safeguards measures is obtained and verified; a "strategic point" may include any location where key measurements related to material balance accountancy are made and where containment and surveillance measures are executed.

APPENDIX 4

LIST OF INTERVIEWEES

Those individuals interviewed for this study include:

Vienna

Mr. Djali Ahimsa	Department of Safeguards-- Operations International Atomic Energy Agency
Mr. Chia-Shia Lin	Department of Safeguards-- Operations International Atomic Energy Agency
Mr. David A. V. Fischer	Director Division of External Relations International Atomic Energy Agency
Dr. John Hall	Deputy Director International Atomic Energy Agency
Mr. Benjamin Sanders	Head Section for Standardization and Administrative Support Department of Safeguards International Atomic Energy Agency
Mr. Rudolf Rometsch	Inspector General International Atomic Energy Agency
Mr. Michail Ryzhov	Department of Safeguards-- Development International Atomic Energy Agency
Mr. Arthur Waligura	Department of Safeguards-- Development International Atomic Energy Agency
Mr. Werner Ungerer	Embassy Federal Republic of Germany
Mr. F. Jackson	Embassy United Kingdom of Great Britain
Mr. A. Labowitz	Embassy United States of America

Tokyo

Mr. Yoshio Kawashima	Executive Director Nuclear Materials Control Center
Mr. Noboru Kaseda	Manager for Planning Nuclear Materials Control Center
Mr. Hideomi Ishii	Chief, Section for Planning Nuclear Materials Control Center
Mr. Tohru Haginoya	Manager Nuclear Energy Department Mitsubishi Metal Corporation and Consultant to the Foreign Ministry
Mr. Ryukichi Imai	Deputy Manager Department of Engineering The Japan Atomic Power Company and Consultant to the Foreign Ministry
Dr. Takashi Mukaibo	Department of Industrial Chemistry Faculty of Engineering The University of Tokyo
Professor Keiichi Oshima	Department of Nuclear Engineering The University of Tokyo
Mr. Nobuo Ishizuka	Nuclear Fuel Section Japan Atomic Industrial Forum, Inc.
Mr. Harumitsu Iwamoto	Head International Cooperation Division Japan Atomic Energy Bureau Science and Technology Agency
Mr. T. Okasaki	Safeguards Office International Cooperation Division Japan Atomic Energy Bureau Science and Technology Agency
Mr. F. Mizogami	Safeguards Office International Cooperation Division Japan Atomic Energy Bureau Science and Technology Agency
Mr. Tadashi Yamamoto	Director Japan Center for International Exchange
Mr. Atsumi	Science Division United Nations Bureau Ministry of Foreign Affairs

Mr. S. Tamiya	Former Head Atomic Energy Bureau Science and Technology Agency and Director (May, 1968 - July, 1970) Department of Safeguards-- Development International Atomic Energy Agency
Mr. Akira Matsui	Commissioner Japan Atomic Energy Commission
Dr. Haruo Fujii	Nuclear Power Department Federation of Electric Power Companies
Mr. Koji Nakamura	Plutonium Fabrication Division Power Reactor and Nuclear Fuel Development Corporation
Mr. Takaaki Shibata	Department of Nuclear Fuels Development Power Reactor and Nuclear Fuel Development Corporation
Mr. Isao Fukuoka	Chief of Administrative Section Department of Nuclear Fuels Development Power Reactor and Nuclear Fuel Development Corporation
Mr. Hiromasa Nakano	Department of Nuclear Fuels Development Power Reactor and Nuclear Fuel Development Corporation
Dr. Muto	Plutonium Laboratory Tokai Works Power Reactor and Nuclear Fuel Development Corporation
Mr. Yoshiaki Matsuno	Senior Researcher Experimental Fast Reactor Division Oarai Engineering Center Power Reactor and Nuclear Fuel Development Corporation
Mr. Katsuji Higuchi	Deputy Manager Tokai Works Power Reactor and Nuclear Fuel Development Corporation

Dr. Shoji Nomoto	Senior Project Engineer Experimental Fast Reactor Division Oarai Engineering Center Power Reactor and Nuclear Fuel Development Corporation
Mr. Mitsuko J. Hirata	Deputy Engineer Tokai Res. Est. Japan Atomic Energy Research Institute
Ambassador Shinichi Sugihara	Councillor Ministry of Foreign Affairs and Legal Advisor (May, 1970-1972) International Atomic Energy Agency
Mr. Yoshitatsu Tsutsumi	Editorial Writer Nihon Keizai Shimbun
Mr. Willis R. Young	Assistant Scientific Representative Atomic Energy Commission Embassy United States of America
Mr. Myron B. Kratzer	Science Attache Embassy United States of America
Mr. Gerald Helfrich	Atomic Energy Commission Embassy United States of America
Mr. Desaix Anderson	Political Officer Embassy United States of America
Mr. R. Wickel	Political Officer Embassy United States of America

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Little of the material on which this study is based is widely available in the United States. Many of the entries cited in this Bibliography, notably in the second half, refer to articles and documents collected in Vienna and Tokyo during the academic year 1973-1974 which have been of particular value in completing this work.

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