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POLITICAL DECISIONMAKING IN THE JAPANESE

CIVILIAN ATOMIC ENERGY PROGRAM

By

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B.A. June 1961, University of Florida

M.A. February 1963, University of Missouri

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TO THE GRADUATE SCHOOL OF ARTS AND SCIENCES:

As Director of Research for Rodney L. Huff
(student's name)

I hereby certify that I have read the final form of the doctoral dissertation submitted by the above student, and that I recommend its presentation to the Final Oral Examination Committee.

Director of Research

Date: 22 Mar 1973

As an additional Reader of the doctoral dissertation submitted by the above student, I hereby recommend that it be presented to the Final Oral Examination Committee.

First Reader

Date: 22 March '73

Benjamin [illegible]
Second Reader

Date: March 26, 1973

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While the title page of this dissertation reflects only the name of the author, there are a number of people who merit a brief but sincere acknowledgement of their efforts in bringing the study to completion. First, Mr. James E. Webb provided a most generous dissertation fellowship through the Program of Policy Studies in Science and Technology of George Washington University. For this, the author would like to express special appreciation, both professionally and personally.

As part of the research for this paper, a questionnaire was distributed to several hundred Japanese scientists and political decision-makers. For the successful completion of this phase of the study, the author is indebted to Marshall L. Hendricks, Esq. of Washington, D.C. Mr. Hendricks volunteered the resources of his Tokyo office for help in the printing, distribution and collection of the questionnaire in Japan. His associate, Mrs. Kimiyo Otsuka, contributed invaluably to this project by managing the numerous and demanding editorial and administrative duties which had to be completed on that end. Mrs. Yoko Boettcher proved a very willing and able translator, both in drafting the questionnaire initially and in helping to tabulate the many and, in a few instances, quite lengthy written comments returned with the answered questionnaires.

Finally, to my wife Sally, who shared fully in the many hours of perseverance and occasional moments of triumph that are represented here, I offer a wholly inadequate but heartfelt thanks.

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CHAPTER I

INTRODUCTION

The subject of this study is "Political Decisionmaking in the Japanese Civilian Atomic Energy Program." Its focus is on the development of atomic energy technology in Japan, the impact of this technology upon the Japanese political system, and the response of Japanese decisionmakers. The decisionmaking process which will be examined in this paper is not unique to the question of atomic power nor is it peculiar to Japan. In fact, the confluence of technological and social questions at the locus of political decisionmaking has become more and more prevalent in all modernized societies. This phenomenon can be expected to become even more widespread as the number of nations actively participating in an industrialized international society increases. The promise of tangible rewards as well as the national prestige associated with being au courant technologically will exert a very great push on nations seeking to achieve full and equal status in the international political society of the Twentieth Century. The urge to make this transition on the part of most countries of the world, and the drive to continue expanding the scientific frontier on the part of those nations comprising the technological vanguard, will result in increasing conflicts of the kind posed in the atomic energy question. The record of political decisionmaking available at the conclusion of this study should provide guideposts for the future in similar questions involving technology's impact on society.

The thesis of this paper proceeds on the assumption that the political function of policymaking (the setting of goals, determining of priorities, and allocating of resources) can take place on a rational basis only to the extent that the parameters of the technological functions of policymaking (the means through which action is taken) are appreciated by political decisionmakers. With the increasing complexity and technicality of policy means inherent in questions like atomic energy, the flow of communicative input into the policymaking equation can be interrupted. The speed of technological change, the scope of scientific discovery and technological application which accentuates the interrelatedness of man and his environment, and the intensity with which science and technology have caused society to reevaluate goals, redefine priorities and reallocate resources compel a restatement of the requisites of effective political decisionmaking.

Atomic Energy as a Political Issue-Area in Japan

As a political issue-area, atomic energy decisionmaking requires an extraordinary degree of responsibility since it entails an extremely large commitment of resources, both human and material, over extended periods of time. A complicating factor is the relatively low degree of assurance concerning the ultimate impact these policy decisions will have. As societies become increasingly technologically oriented, the political futures of individual states and of the global community at large will come to be shaped more and more by decisions made within an environment in which the ultimate impacts of those decisions are not well perceived. Because technology, both in its applied and experimental forms, is becoming an increasingly important variable in determining the degree to which national polities can exercise influence over their environment, it is assumed that there will continue to be a positive correlation between the technological sophistication of a society and the success its political leaders will have in dealing with existing societal patterns under changing environmental conditions. This will be true as much within individual national units as it will be between national polities on the global level.

Japan is today a nuclear power and has for years been recognized as the most advanced nation in atomic technology in the Far East. As early as 1903 Nagaoka Hantaro, a Japanese physicist, produced an atomic structure model. In 1935 Yukawa Hideki proposed the neutron theory which won him a belated Nobel prize for physics in 1949. In 1965 Tomonaga Shinichiro took a second Japanese Nobel physics award.

Between 1936 and 1945, three cyclotrons were in operation in Japan, and in 1943 experiments were begun on enriching uranium. At the end of World War II all nuclear fission research was ended by the Occupation, and the cyclotrons destroyed. By 1950, however, nuclear research had revived and Japan's cyclotrons were rebuilt.[1] Since that time, Japan has progressed to the point where it is one of the world leaders in peaceful atomic energy research and development. Since 1956 it has retained a permanent seat on the International Atomic Energy Agency, and it is now beginning to export its own reactor technology to other countries in Asia, including the People's Republic of China.

Today, the political future of Japan is, to use an often misapplied analogy, truly at a crossroads. Atomic energy policy presents Japanese decisionmakers with some of the most significant political issues of all. The energy crisis is an ever-present reality in Japan. Recently, Japanese oil refineries have faced the prospect of closing down for lack of sufficient

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[1] Suketoshi Yajima, "ApPropos Des Sciences et Des Techniques au Japon Depuis 1900," Journal of World History, IX (1965), 182-86; Yoshiro Hoshino, "Science and Technology," Japan Quarterly, XIV (January-March, 1967), 45-52; and Asahi Shimbun, Mar. 31, 1969 in DSJP, Apr. 2, 1969, p. 44.

imports to handle surging industrial needs. Atomic power is being looked to to "solve" the crisis, but since the Japanese reactor program relies heavily on nuclear research (much of it defense oriented) in other countries, and because Japan also must depend on other countries for so many of the vital raw materials needed to fuel and operate its industrial sector, it is doubtful that a final solution will ever truly be found. Also, atomic technology, which until a few years ago was still in the theoretical or developmental stages, is now being applied to generate electricity. Japanese decisionmakers are now facing the problem of how to adjust the often conflicting needs of society, which wants and needs the material benefits that atomic technology can give, with the equally strong desires of individual members of the society to be secure in their homes and persons from the terrors that atomic energy can also inflict upon them. This conflict, it would appear, has just begun to manifest itself and will come to occupy Japanese political leaders to a greater and greater degree.

Lately, the question of a military application of this power has gained attention. There is no doubt that the same technology which has made Japan a major producer and consumer of atomic energy in its peaceful forms could also provide Japan with the makings of a major nuclear military force at least on the present level of Britain, France, and China, and possibly even the Soviet.Union. The challenge of the age is basically one of how to encourage the equitable spread of nuclear technology for peaceful purposes while preventing the proliferation of the weapons that this technology makes possible. Technologically, however, the day is past when nuclear weapons proliferation can be controlled by denying nuclear know-how to non-nuclear-weapon states. The state of the art is too far advanced and knowledge too widespread to make possible such control. Applications of nuclear energy will grow apace in the coming decades. Weapons control and disarmament must be calculated within such an international milieu, not in opposition to it. Should Japan indeed turn to nuclear weapons the cause of nonproliferation will have been dealt a severe blow, and the prospect of other states following in its wake would be very real. At the very least, a nuclear-armed Japan could noticeably increase tensions throughout northeast Asia.

It is a working hypothesis of this study, however, that Japan's current orientation on fundamental nuclear energy policy is influenced more directly by immediate concerns of peaceful application than by some hypothetical military need. To date, Japan has actively encouraged international technology sharing and weapons control measures. This is true despite the fact that China has already committed her resources to building a nuclear arsenal, while India has refused to sign the Nonproliferation Treaty. Recently, Japan has been concerned over continued availability of imported energy fuels and the price competitiveness of its rapidly expanding nuclear energy export industry. Also, many Japanese have expressed doubts about the equity of nonproliferation schemes, which seemingly impose a permanent technological inferiority on non-nuclear-weapon states. Moreover, anxiety over the outcome of the menage a trois involving Japan's powerful, nuclear-armed neighbors has encouraged a rethinking of the goals, priorities and tactics of nuclear energy policy for the 1970s. What course Japan embarks upon will go far in shaping the realities of Far Eastern politics for the rest of the century.

A Note on Sources

Sources which treat the atomic energy development program in Japan from the standpoint of a comprehensive decisionmaking process are very limited. Non-Japanese studies on atomic energy issues through the mid-1960s generally dismissed Japan in a very minor fashion or ignored developments there entirely. More recent literature, especially that focusing on the nonproliferation of nuclear weapons, usually deals with the strategic ramifications of a Japanese nuclear military force, but there is little treatment of the related social and political issues in Japan apart from rearmament.

Atoms in Japan, a monthly publication of the Japan Atomic Industrial Forum, proved to be an invaluable source of information for this study. Although a good portion of the journal is devoted to questions of a highly technical nature, the political and social issues surrounding technical developments, are also illuminated. The Japanese news media also proved an extremely useful source of data. Unfortunately, no subject index for Japanese dailies is available. However, the American embassy in Tokyo provides quite adequate coverage of the media in its Daily Summary of the Japanese Press and Selected Summaries of Japanese Magazines. The atomic energy program has received fairly steady coverage by the Japanese media, and periodically there are reports at some length on roundtable discussions between leading politicians, scientists, and academic figures on topics dealt with in this study. Official Japanese government white papers and other statistical data are available at the Library of Congress.

The author is grateful to Matsui Takashi of the Japan Atomic Energy Research Institute, Matsui Konomu of Rikkyo University, and Sugiyama Kunio of the Tokyo Shimbun Science Desk for their assistance in collecting reference data and in sharing their personal observations on atomic energy development in Japan. Also, a discussion with Dr. Harold D. Bruner, Assistant to Commissioner Ray of the U.S. Atomic Energy Commission, was useful in providing

an American perspective on the Japanese decisionmaking process.

The views of Japanese scientists and political decisionmakers also contributed to this study through a questionnaire prepared by the author. Of the 550 individuals contacted, 177 (32%) replied. Chapter VII is largely devoted to an analysis of the attitudes of these individuals as revealed through the questionnaire. In addition to answering the forty prepared questions, many of the respondents elaborated, some at great length, on certain points touched upon by one or more of the questions. These individuals, collectively, also represent an invaluable source of information for the analysis which follows.

Technology as a Delimiting Factor

Planning for scientific activity has placed certain strains on political decisionmaking in modern technologically developed societies. In recent years science has opened a wealth of possibilities to mankind never dreamed of a few years before. Through the continuing interchange of scientific theory and practical application, these possibilities have grown exponentially, building one upon the other to the point where a complete grasp of the interlocking policy implications comprised within them is impossible except in the most general terms.

The process of scientific discovery and application might be thought of in terms of an expanding spiral which continually yields novel technological possibilities for dealing with old social and political problems, while at the same time, it widens the scope of social activities which have become recognized as legitimate issues of political decisionmaking. Calder has discussed this phenomenon in terms of technological "fixes" and technological "lures."[1] The idea of a technological fix is not a new one, and involves using a technological innovation to treat a social or political ill. Technological fixes have been common from ancient times when, for example, problems brought on by expanding populations and limited agricultural productivity were met through the technology of hydraulic engineering. To the concept of a technological fix Calder adds that of technological "lures." These comprise "brand new goals . . . which could not be contemplated until the necessary research and invention had ripened."[2] A good example is atomic energy which holds out such prospects as obtaining unlimited fresh water from the sea, overcoming the growing problems of waste disposal, and releasing man from his dependency on diminishing fossil fuels in the face of growing energy needs.

Although technological fixes and lures are not new in human history, the rate at which technology is impacting upon society, the multiplicity of ways in which technology affects the individual in his daily life, and the scope over which these impacts are felt throughout society are unprecedented. More people are being affected, more directly and more rapidly, than ever before. As these technological phenomena come to impinge on the allocation of human and material resources within societies, they inevitably become political in nature. As Calder notes, technological lures and fixes must "court controversy" if they are to have any relevance to human problems. However, in doing so they become "politically dangerous"[3] to the extent that they make added political demands on the existing policymaking process.

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[1]Nigel Calder, Technopolis: Social Control of the Uses of Science (New York: Simon and Schuster, 1969), pp. 289-94.

[2]Ibid., p. 293.

[3]Ibid., p. 294.

In the literature dealing with the impact of technology on society, one school of thought would attribute a commanding role to technology, as though by some internal logic technological developments prescribe political realities.[1] The analysis of policymaking in the Japanese atomic energy program which follows does not support such a thesis. Rather, technology is viewed as one factor which delimits the alternatives of decisionmaking. The thrust of technology in modern times has been to expand decisional choices, although this need not necessarily be so, as the growing threats of environmental pollution and the search for nonproliferation formulas make clear.

While rejecting the notion of technology as a decisionmaking determinant, it can be said that technology often acts as a decisionmaking imperative.[2] In the first place, governments find it very difficult if not impossible to ignore the great opportunities which technology opens to them. There is in modern societies a kind of "fiduciary morality"[3] which leads decisionmakers to draw upon all available resources in order to enhance the physical well-being of the citizens of the state and ensure the continued increase of national wealth and power. Few political leaders are disposed to anything less than exploiting the full measure of resources available to

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[1] The view that a scientific elite is emerging and gathering political authority into its own hands is developed in such works as Thorstein Veblen, The Engineers and the Price System (New York: Viking Press, 1940); James Burnham, The Managerial Revolution (New York: John Day, 1941); Ralph Lapp, The New Priesthood (New York: Harper and Row, 1965); and Don K. Price, The Scientific Estate (Cambridge: Harvard University Press, 1965).

[2] For the idea of a decisionmaking imperative the author is indebted to the concept of technology as a "forcing" factor in political development expounded by Eugene B. Skolnikoff, The International Imperatives of Technology (Berkeley: University of California Press, 1972), pp. 7-8.

[3] This concept is developed by William Riker in The Theory of Political Coalitions (New Haven: Yale University Press, 1962).

them, and if they do, it is at some political risk. Technology offers a challenge, a lure, and men are drawn to it like the climber to the mountain, because it is there.

Technology acts as a decisionmaking imperative, also, because of the extent of its impacts throughout society. Whether or not a government undertakes to make decisions relative to the applications of technology which occur, it cannot isolate itself from the effects which technology produces within the social system. There is no "invisible hand" to regulate the myriad of small impacts that different technologies make in discrete cases. Unlike the marketplace of ideas, where competitive interaction can be said to have a counterbalancing effect and to enhance the value of the end product, the cumulative effects of random technologies seldom cancel each other. Usually there is a widening spiral of repercussions which disturbs the <u>status quo</u> and creates new demands on decisionmaking units. Political decisionmakers must deal with these demands in one way or another, and because of this inability of governments to immunize themselves from the effects of technology, either as a lure to new goals or as a consequence of secondary impacts, one can say that technology frequently does act as an imperative to "force" political decisions.

Conceptual Framework

The body of literature available on decisionmaking is vast. Not only political scientists, but also sociologists, economists, and psychologists have sought to distinguish the constituent elements of the process by which decisions are made and to explain why they function as they do. There is not the space to review here all the literature on decisionmaking nor to categorize the often overlapping and sometimes conflicting conceptualizations of the various subprocesses therein.[1] However, it is necessary to outline the decisionmaking model used in this study to conceptualize the process by which political decisions in Japan's atomic energy development program were reached. To that end, a brief summary of the literature, terminology and assumptions relative to the question at hand follows.

Three general concepts of the decisionmaking process have influenced the choice of a framework for this study of policymaking. One of these, which has preempted the "rationalistic" label, dates from earlier examinations of economic decisionmaking by the utilitarian school. The rationalistic thesis posits that a decisionmaker approaches any problem from a comprehensive framework, orders all possible solutions in terms of their utility to him, and then selects the one alternative that provides him the optimum utility. Harold Lasswell applied rationalistic premises to political decisionmaking by means of a hierarchy of functional categories which he used to explain the decisional process.[2]

The rationalistic model did not prove especially successful in explaining decisionmaking behavior outside a theoretical framework where the number of independent variables influencing the decisional process could not be held constant. Simon and March went a long way in loosening the

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[1]For a concise but extremely useful survey of recent decisionmaking literature in political science see James A. Robinson and R. Roger Majak, "The Theory of Decisionmaking," in Contemporary Political Analysis, ed. by James C. Charlesworth (New York: The Free Press, 1967), pp. 175-88.

[2]Harold Lasswell, The Decision Process: Seven Categories of Functional Analysis (College Park: University of Maryland, 1956); and Harold Lasswell and Abraham Kaplan, Power and Society (New Haven: Yale University Press, 1950).

classical concepts of decisionmaking by introducing the idea of "satisficing" rather than optimizing.[1] Rather than seeking only the single best solution, which entails the review of all possible choices, a decisionmaker will accept one which satisfies him, according to Simon and March. Where Lasswell posited a seven stage decisionmaking ladder, applicable to all decisions, Simon and March provided four processes, two or more of which would be used in different combinations at different times to make a decision. The attack on the rational or "synoptic" approach, as it is sometimes labeled, was carried even further by the concept of "disjointed incrementalism."

Incrementalism, developed most fully by Braybrook and Lindblom,[2] rejected the notion that all decisionmaking proceeds in strictly defined "logical" steps. It also proceeds on the assumption that most policies are formulated not by a few, general decisions of grand sweep, but by a plethora of small acts which bring about changes in small, "incremental" steps. End results are rarely foreseen by decisionmakers since the final product depends on how the numberless small decisions interact in the aggregate to affect each new step in the continuing cycle. The incrementalists also rejected the concept of a single "synoptic" definition of rationality. The most rational decisional process will depend on the nature of the problem at hand, and Lindblom defines rationality as adapting a decision to the "real world." He feels that "mutual adjustment" among various so-called partisans

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[1]Herbert Simon, Models of Man:—Social and Rational (New York: Wiley Press, 1957); James G. March and Herbert Simon with H. Guetzkow, Organizations (New York: Wiley Press, 1958); and James G. March, ed., Handbook of Organizations (Chicago: Rand-McNally and Co., 1965).

[2]David Braybrook and Charles E. Lindblom, A Strategy of Decision (New York: The Free Press, 1963); Robert A Dahl and Charles E. Lindblom, Politics, Economics, and Welfare (New York: Harper and Bros., 1953); Charles E. Lindblom, "The Science of Muddling Through," Public Administration Review, XIX (1959), 79-99; and Charles E. Lindblom, The Intelligence of Democracy: Decision Making Through Mutual Adjustment (New York: The Free Press, 1965).

in the decisionmaking process is every bit as "rational" as is a centralized coordinating system of decisionmaking. The purpose of mutual adjustment is to mold "values or interests to reduce conflict," and not simply to choose among conflicting values, Lindblom states.[1] Policy coordination, which by the rationalistic interpretation occurs by conscious direction of a central decisionmaker, under the mutual adjustment concept occurs when "everyone agrees on a set of values sufficiently complete and well-structured to provide adequate criteria for decisions."[2] Lindblom stresses the continuum concept of decisionmaking, and posits his partisan mutual adjustment type as one "extreme," the other extreme being completely centralized decision-making. He even identifies three different types of partisan and twelve types of mutual adjustment.[3] Where the more traditional concept of centralized rational decisionmaking strives for unity and orderly progression, the incrementalist approach commends "discordant values" which ensure that "the adverse consequences of any one decision for the other decisions are to a degree and in some frequency avoided, reduced, or counterbalanced or overweighed."[4]

The incrementalist approach to decisionmaking was, in turn, criticized as circular, lacking in innovation, prone to inertia, and fraught with the danger of being controlled by powerful interest groups.[5] To recapture the

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[1]Lindblom, The Intelligence of Democracy, op. cit., p. 227.

[2]Ibid., p. 22.

[3]Ibid., pp. 29-32, 35-84.

[4]Ibid., p. 237.

[5]Amatai Etzioni, The Active Society (New York: Rinehart and Winston, 1961); Kenneth E. Boulding, a review of A Strategy of Decision, by David Braybrook and Charles Lindblom, in American Sociological Review, XXIX (1964), 930-31; Yehezkel Dror, "Muddling Through--'Science' or Inertia?" Public Administration Review, XXIV (1964), 153-57; Amatai Etzioni, "Mixed-Scanning:

value of the comprehensive approach to decisionmaking which he feared was too easily lost in the attention devoted to incremental change, Etzioni has suggested a third approach to decisionmaking which he calls "mixed-scanning." Mixed-scanning is, as the term implies, a combination of certain features of both the rationalist and incremental frameworks, and is better suited than either of these to conceptualizing unwieldy issue-areas like technology assessment which require a firm grasp of fundamental long-range goals and priorities, but which at the same time, are so complex and subject to so many constantly altering variables that they require great flexibility and adjustment in the short run decisionmaking process. In Etzioni's view, it is necessary for decisionmakers to "summarize values" and rank them in some order, even though they cannot always weigh them accurately. Etzioni agrees that incremental decisions are more numerous than fundamental decisions, but not necessarily more important. He would make no firm distinction between the ultimate significance of incremental as opposed to fundamental decisions. It is the fundamental decisions which "set the stage," but even incremental decisions themselves may lead to fundamental decisions through their cumulative effect over a period of time. In turn, the "cumulative value of the incremental decisions is greatly affected by the underlying fundamental decisions."[1]

The decisionmaking model utilized in this study of the atomic energy policymaking process in Japan will consist of the basic input-output

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A Third Approach to Decision-Making," Public Administration Review, XXVII (1967), 385-92.

[1] Etzioni, The Active Society, op. cit., p. 289.

principle elaborated by Easton and Snyder.[1] This study is indebted to these pioneering works for political concepts like "input," "output," "outcome," "decisional unit," and "feedback." Certain terminology, like "perceptual and operational" outcomes and "perceptual and operational distortion," are the author's. These elements of the present study are also indebted to earlier studies of concepts like "image," "perception," and "noise" by such writers as Boulding, Holsti, and Deutsch.[2] These works will serve as an orienting frame of reference because the theoretical concepts contained in them have been particularly useful in drawing the operational guidelines of this study. The author, of course, takes full responsibility for the manner in which these ideas are applied and for the inferences drawn from them. The dynamics of the decisionmaking process in the Japanese atomic energy development program will now be examined, with reference to the flow chart presented below.

It is necessary to preface the discussion of decisionmaking flow with brief definitions of two terms which will be used throughout; i. e., political and political actor. Political, as used in this study, will be designate three social processes; the formulation of societal goals, the determination of societal priorities, and the allocation of societal

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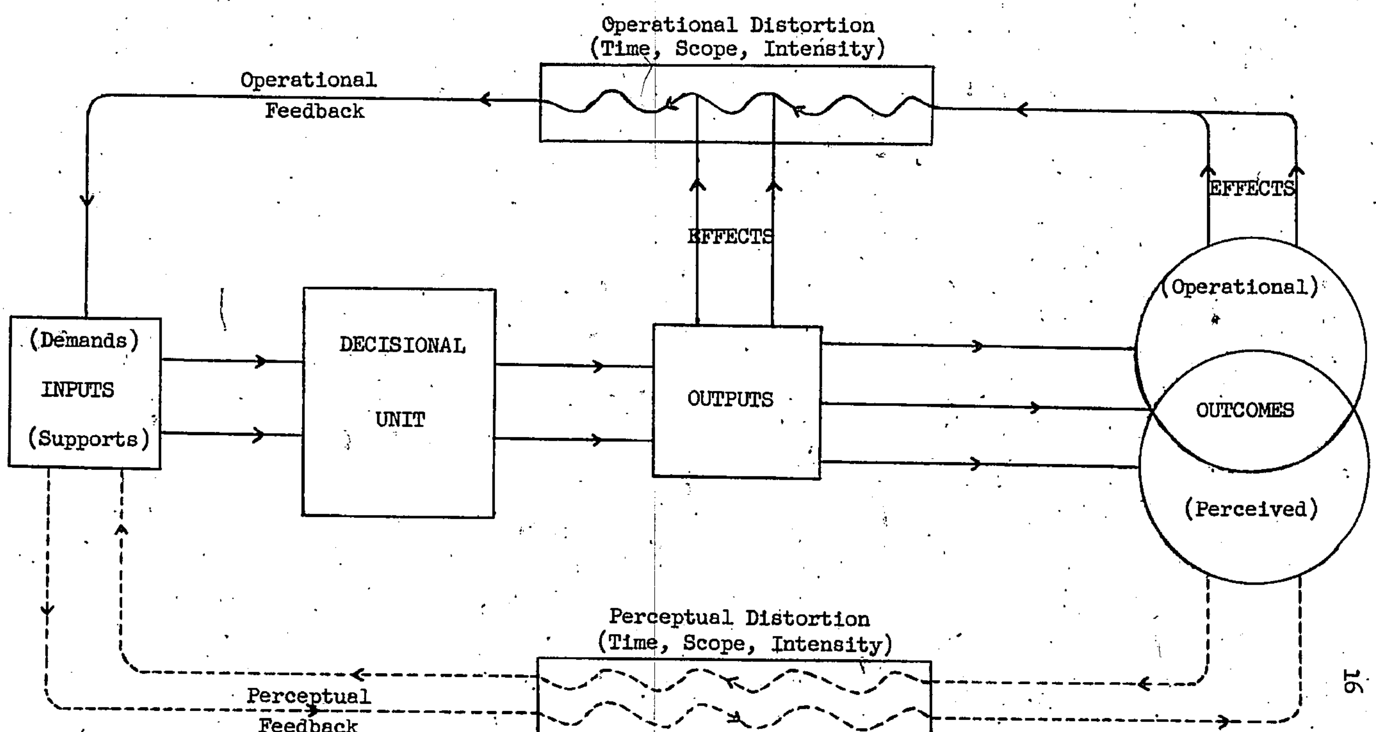
[1]David Easton, The Political System (New York: Knopf, 1953); David Easton, A Framework for Political Analysis (Englewood Cliffs, N.J.: Prentice-Hall, 1965); Richard C. Snyder, H. W. Bruck, and B. W. Sapin, Decision-Making as an Approach to the Study of International Politics (Princeton: Foreign Policy Analysis Project, 1954); Snyder, Bruck and Sapin, Foreign Policy Decision-Making: An Approach to the Study of International Politics (New York: The Free Press, 1962); and Richard C. Snyder, " A Decision-Making Approach to the Study of Political Phenomena," in Approaches to the Study of Politics, ed. by R. Young (Evanston, Ill.: Northwestern University Press, 1958).

[2]Kenneth Boudling, The Image (Ann Arbor: University of Michigan Press, 1956); Ole R. Holsti, "The Belief System and National Images: A Case Study," Journal of Conflict Resolution, VI (1962), 244-52; and Karl W. Deutsch, The Nerves of Government: Models of Political Communication and Control (New York: The Free Press, 1963).

CHART 1

DECISION-MAKING PROCESS FLOW CHART



resources. These political processes take place within the formal governmental structure, and the decisions which emanate from the decisional unit are considered authoritative. A political actor is defined as an individual or group of individuals that in some way seeks to affect the formulation of goals, the determination of priorities, and the allocation of resources.

The most logical point at which to begin dissecting the decisionmaking flow is with the decisional unit. The decisional unit for purposes of this study is the Japanese Cabinet. Responsibility for atomic energy development programs is centered in the Prime Minister's Office, and it is here that final authoritative decisions on goals, priorities, and resources are made. Restriction of the decisional unit in this manner does a certain amount of damage to decisionmaking as a dynamic concept, for the formal decisions emanating from the Cabinet are generally a function of the interaction among a considerable host of factors outside the decisional unit. These are subsumed under inputs.

Decisionmaking inputs represent those interests which have been articulated, to one degree or another, by the actors within the political system. These inputs may be in the form of supports for decisionmakers or demands on them. The interests so articulated may be those of individuals, or of groups outside the formal governmental framework which aggregate the collective interests of their individual members, or of groups within the formal political structure like bureaucracies or parties. It should be noted that the supportive bureaucracies within individual government ministries and agencies will be considered as separate actors with discrete interests to be articulated. In some instances, these interests coincide; in others, they conflict.

If one conceives of inputs entering one side of the decisional unit "box," the obverse consists of outputs emanating from it. Outputs are the decisions which to some degree change the distribution of goals, priorities, and resources that transpired previously. Outputs may either alter that distribution or reinforce it. Decisional outputs are formulated within the decisional unit with specific goals in mind, in order that the decisionmakers may influence certain variables within the system. Decisions do not always have the intended effect, however, and so decisional outputs are distinguished from decisional outcomes. The distinction between outputs and outcomes is made by Easton and stressed here. These "operational outcomes" ("perceived outcomes" will be dealt with shortly) are distinguished only over the long run, and their effects can vary greatly from those intended in the original outputs.

Decisional outputs and outcomes are tied into the decisionmaking process by virtue of the effects they have on the environment within which decisions are made. As outputs and outcomes bring about changes in goals, priorities, and the allocation of resources within the environment, they frequently generate new political demands which impact upon the decisional unit. This phenomenon is represented by the operational feedback loop. The precise form in which new interests may be articulated is difficult to predict because of the great number of variables that must be taken into account. These variables taken together are labeled "distortion." The degree of distortion will vary according to the time span over which the original decision has effect, the scope of the decision (i.e., the number of discrete actors and interests upon which the decision has a political impact), and the intensity of the decision (i.e., the importance of the interests upon which it has a political impact). Thus, in general, it is assumed that those decisions which affect a greater number of actors and actor interests, affect more important or fundamental interests, and do so over a longer period of time will stimulate more new inputs (demands and supports) than decisions whose impact is on a smaller number of less important interests over a shorter period of time.

All of this may be abbreviated, for convenience sake, to "more political output equals more political input." Were the actual effects of decisions always identical to the effects intended by decisionmakers the process would be complete. However, decisionmakers seldom anticipate all or even the most important effects of the decisions they make. Certain decisions which are conceived of in terms of great scope and intensity may turn out to have little of the impact intended, or at least not the same impact. Other decisions, of seemingly minor significance, may stimulate inputs far greater in number and importance than expected. These latter often lead to crises, and are of special concern to political decisionmakers because they often result in unexpected demands for resources, and require readjustment of priorities or setting of new goals. Then, too, developments within the larger social environment may lead to demands which have never before been articulated in political terms. Decisionmakers must decide how to respond to such unanticipated demands, or they must decide to make no response.

This dissonance between the intended effects and the actual effects of decisional outputs is partly a matter of perception. Perceptual factors in decisionmaking are extremely difficult to define in precise terms since they are rooted in the thought processes of individuals. Robinson and Majak have labeled this aspect of decisionmaking the "intellectual" process. It includes "'subjective probability,' insight, creativity, intuition, perception, cognition, and the like . . . ."[1] One's perception of an issue will have a most fundamental effect on the way one orders priorities to deal with the problems involved, the sort of questions one feels is relevant to ask about the problems, and the outcome one expects to affect through the political decisionmaking process.

Each individual actor who formulates inputs into the decisional process will do so in terms which reflect his perceived outcomes. These perceived outcomes have both a factual and value content; that is, they will comprise both the actor's image of reality as he believes it to be and his image of what it should be. The exact mixture of what is and ought to be that goes into making up an actor's articulated input will vary from individual to individual. The exact logic through which demands are articulated does not concern us here, except in one respect. It will be assumed that, although idiosyncratic factors rooted in the psychological make-up of the individual will account in some small degree for the manner in which interests are articulated, the controlling factor will be the exepctations that flow from the role the actor fills. Thus, the articulation of demands by a foreign minister, chairman of the Japan Science Council, or president of the Japan Fishermen's Association will be assumed to be a function of the articulator's position as a minister, chairman or president, rather than from some unique qualities of the inner man, *per se*.

Perceived outcomes will seldom equate precisely with operational outcomes for two reasons. First, as noted above, political development is too complex to be easily predictable. As in the case of operational distortion, the accuracy of perception will decrease as the time, scope, and intensity factors of the situation the actor is seeking to perceive

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[1] Robinson and Majak, "The Theory of Decision-Making," *op. cit.*, p. 180.

increases. Therefore; one reason for the dissonance between perceived and operational outcomes is the limitation of the human brain in dealing with great numbers of random variables.

A second reason for the dissonance between perceived and operational outcomes lies in the differing values held by various actors. As a general principle, one would expect that those interests which are articulated as inputs and gain access to the decisional unit to be utilized by the decisionmakers in formulating decisions, will be reflected in outputs and eventually in outcomes to a greater degree than those interests which are not. The frustration of the Japanese socialists, and of others friendly to their point of view, at being left out of the decisionmaking process is a case in point. Failure even to have interests articulated, as has been the case so frequently with the unorganized public, can also lead to a great degree of dissonance between perceived outcomes on a societal level and operational outcomes.

If one of the primary objects of political decisionmaking is to achieve a reliable process for stable social change, the dissonance between perceived and operational outcomes should be minimized. To a certain extent dissonance can be lessened by defining clearly at the outset of the planning stage the ultimate objectives decisionmakers hope to achieve. These long-range goals should be accompanied by shorter range objectives to serve as benchmarks and opportunities for adjusting priorities and resources. Thorough planning studies should reflect as many alternative solutions as possible for anticipated problem areas. With sophisticated computer technology, calculation of the various permutations of considerable numbers of variables should be possible. Very important is a provision at the beginning for reassessment of short-range developments in terms of long-range objectives at frequent and regular intervals. One of the main objectives of the mixed-scanning approach is to identify potential trouble spots at various stages of implementation of the plan so that special attention can be given them at critical moments.

A second means by which dissonance can be reduced is to have interplay among the widest possible number of definable interests throughout the decisionmaking process. This is true as much for long-range, fundamental goals as it is for immediate, incremental decisionmaking. By broadening the base of inputs into the decisional unit, decisionmakers make themselves more aware of the scope and intensity of their decisions in the wider environment. They will thus be better able to appreciate the effects decisional outputs will have over the long and short range, and anticipate secondary consequences of their actions which might have gone undetected from a more narrowly articulated set of inputs. As a recent study by the United States National Academy of Sciences concludes, "technological changes, like other alterations in complex systems, ought not to be made in ways that subordinate every other consideration to the dominant purpose of the immediate project." Rather, decisionmakers should take into account the impact of the project on the full range of other values and interests . . . ."[1]

This decision is a purely political one and depends on the industry of decisionmakers in seeking out additional and often adverse opinions. This need for pluralistic input is what Calder speaks of as "democracy of the second kind."[2] As Ferkiss notes, there is at present "(N)o institutional

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[1]National Academy of Sciences, Technology: Processes of Assessment and Choice (Washington: U.S. G.P.O., July, 1969), p. 31.

[2]Calder, Technopolis, op. cit., p. 339.

mechanism for eliciting, weighing and implementing popular decisions on such matters."[1] This is surely the challenge which technology puts to politics in the post-industrial age.

Outline of the Study

Technology has been defined as "the organization of knowledge for the achievement of practical purposes."[2] Through the organization of existing knowledge, and the acquisition of new bodies of knowledge, associety is able to exploit its existing store of physical resources more fully or in new and different ways, and to develop untapped resources for socially beneficial ends. This organized knowledge, or technology, has the effect both of opening new opportunities and, in the course of doing so, of placing new demands on that society in terms of allocating these resources among its members, determining the practical purposes which best suit the society's needs, and establishing a set of social priorities for weighing the potential utilities of such resources to various individuals and groups within the society. Thus, when the existing body of technology in any society is altered, the society's goals, sets of priorities, and allocation of resources will also be subject to change. It is the purpose of the political system in a society undergoing this sort of change to see that a new equilibrium of goals, priorities and resources which is acceptable to the members of the society is arrived at in a rational and non-disruptive manner.

When a society undergoes a very large infusion of new technology over a short period of time, the stress placed upon the political system is

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[1] Victor C. Ferkiss, Technological Man: The Myth and the Reality (New York: George Braziller, 1969), p. 191.

[2] Mesthene, Emmanual G., Technological Change (Cambridge: Harvard University Press, 1970), p. 25.

potentially very great. The success of the political system in adapting to these stresses will depend on many factors. These include the facility with which the society can meld new goals into the set of social goals that already exists; the degree to which existing forms of political organization can serve as a basis for ordering new priorities and allocating new resources; the extent to which the new demands for the distribution of physical resources and technological know-how can be met through existing social and economic structures; and the extent to which the cycle of technological supports and demands, political outputs and outcomes, and societal feedback operates wholly within the cultural and geographic boundaries of the single society or is affected by interaction with extra-societal political systems over which the actors in the original system have little control.

Over the past two decades, Japanese society has been subjected to a large influx of organized knowledge in the form of atomic technology. The Japanese political system has had varying success in integrating the demands brought about by atomic technology for new allocations of physical resources and new forms of social organization with existing Japanese political and social structures. The record is presented here in ten chapters.

This first chapter reviews the research goals and the conceptual framework within which the data will be organized. Chapters II and III will discuss the formal Japanese governmental structures which were established to formulate a program of complementary goals and priorities for the application of atomic technology to social needs. They will also analyze the process through which long-range and short-range planning takes place. It will be seen that the technological impact of atomic energy has not given rise to any new concepts of national political organization. The bureaucratic principles which have guided the distribution of technological and economic resources in other areas have been applied to this new policymaking field.

Outside the formal governmental framework, the impact of the atomic technology complex on Japanese society has stimulated many new demands, or intensified existing ones, both on the national and global level, which go beyond purely technological questions. These issues raise some fundamental questions like the receptivity of central decisionmakers to the articulation of interests by the public at large, the extent to which policy outputs should be responsive to judgments of technical advisors who command scientific expertise but lack political responsibility, and the degree to which international political actors should influence the ordering of societal goals and priorities and the allocation of societal resources within the Japanese political system. There are differences of opinion as to how adequately the Japanese political process has taken such factors into account in planning, and these topics will be discussed in succeeding chapters.

Chapters IV and V show how the requirements for specific technological resources leads to the articulation of political demands, and in turn, how broad political goals serve to structure the way in which specific technological needs are met. The medium used to illustrate this interlocking cause and effect is the nuclear fuel cycle. One of the principal political controversies stemming from the technological imperatives of the fuel cycle is the degree to which Japan should allow non-Japanese political actors to influence her domestic social processes. Japan lacks any appreciable quantities of the basic fuels to produce the energy upon which her present industrialized society is dependent, especially in her atomic program. She has been almost entirely dependent on resources located geographically beyond her borders. Japan has also depended heavily on imported atomic technology. This dependency was accepted by Japan's political decisionmakers as the price that would have to be paid for rapid atomic energy development. The Japanese have never been comfortable with the political aspects of this technological dependency, however, and Chapter V discusses their struggles to minimize political penetration while maximizing scientific and technological contacts with other countries which have advanced atomic energy programs. For Japan to sustain her drive for technological excellence, she must forge strong technological linkages between all levels of her own scientific, economic, and industrial sectors and those of other countries. At the same time, Japan is experiencing a renewal of a sense of national pride and independence which raises questions as to the legitimacy of such influences from outside forces on her own political processes. The resulting tension between these two objectives is a manifestation of the impact that technological development can have on national political processes.

Chapters VI and VII will explore the influence of the Japanese public and scientific advisors on policymaking through the articulation of political demands. The role of the public until recently has been a largely passive one. The government and the atomic industry have conducted a fairly modest but well publicized public relations campaign since the mid-1950s with quite positive results. Recently, however, as the widespread location of atomic reactors in heavily populated areas has become imminent, public concern has been expressed over the perceived potential dangers of atomic energy plants. Such debates have been going on for some time among a limited group within the atomic energy community in Japan. Only lately, though, has the debate taken on any potential electoral significance. Demands for a resolution of this conflict, between the growing energy needs of the society at large and the perceived threat of atomic energy facilities to the health and well-being of individual members of the society on the local level, are being expressed increasingly through local governments and non-governmental citizen action groups. The record of the rising conflict in the public sphere over these political goals and priorities is examined in Chapter VI.

Advisory relationships between Japanese scientists and political decisionmakers are analyzed in Chapter VII. Official channels for articulation of interests by the scientific community are reviewed, and the perceptions that scientists and decisionmakers each have of the political decisionmaking process, both in terms of cognitive and normative attitudes, are examined. A questionnaire distributed to 550 Japanese scientists and political decisionmakers provides the comparative data used in this chapter. The concept of perceptual dissonance serves as a basis for analyzing the results of the questionnaire. Evidence of this perceptual dissonance in the conceptualization of the goals and priorities of the atomic energy development program can be found throughout the pattern of interactions among various political actors. By measuring the spread between the tabulated percentages of responses of different groups of scientists and political decisionmakers to various policymaking-related questions, some estimation can be made of the degree of difference that exists in the perceptions of these groups. The utility of such a measurement is in its ability to identify certain areas where there is broad agreement between various actors on goals and priorities, to spotlight other issues on which there is no well-defined consensus and which might profit from concentrated examination, and to bring into focus those actual and potential problem areas that are liable to prove inimical to the efficient functioning of the decisionmaking process at one time or another.

In Cha ;ers VIII and IX the impact that atomic technology has had on the Japanese political system is examined from the standpoint of Japan's membership in a global community of nations. As a member of the larger international community, Japan's political outputs in the form of goals, priorities and resource allocations serve as inputs to the global environment. In turn, they stimulate responses from other international actors. Since Japan's security and economic well-being are dependent to a significant degree on the continuance of stable relationships with other international actors, her national policy decisions must always be guided to a large extent by what their probable impact will be on the international level in terms of altering the balance of political goals, priorities and resource allocations of other international actors. The linkages between politics and technology on the domestic and international levels has already been discussed in terms of the nuclear fuel cycle. Chapters VIII and IX, however, will deal with questions of a broader political nature related directly to international security agreements and Japan's national defense policy within the international community.

On the international level, certain political goals and political priorities have been formulated to limit the dissemination of atomic technology on the global level. These goals and priorities have been codified in the Nuclear Nonproliferation Treaty, and they reflect most fully the political attitudes of the United States and the Soviet Union. To a certain extent, the NPT also serves the interests of other members of the international community, including Japan. The determination of the superpowers to cooperate in some rational system of controlling the allocation of nuclear resources was welcomed generally by most countries of the world. Likewise, the majority of nations have expressed support for preventing the spread of nuclear weapons technology to non-nuclear-weapon states.

In other respects, however, there is a discrepancy between the goals and priorities of the leading international actors and those of lesser influence. In the case of the Nonproliferation Treaty this is especially evident in the discrepancies between the outlook of the nuclear-weapon states and that of the near- or potential-nuclear-weapon states, Japan being among the latter. Whereas the former place the highest priority on maintaining the international status quo through nonproliferation, other states detect a certain amount of "great power egoism" in the stand of the United States and the Soviet Union, and would place greater emphasis on the reduction of existing nuclear arsenals, credible guarantees for the non-nuclear-weapon states against nuclear attack, and equitable distribution of the technology of peaceful atomic energy development.

Chapter VIII discusses the Nuclear Nonproliferation Treaty in terms of the internal debate in Japan over conflicting priorities set out by Japan and those of the principal drafters of the Treaty, the United States and the Soviet Union. It will be shown that while the Japanese government eventually signed the Treaty, there remained a considerable amount of residual antipathy to Japan's participation. Since the Treaty has not been ratified by Japan and, moreover, is scheduled to come up for international review in 1975, the questions that arose earlier are still to be resolved.

Chapter IX reviews the international security aspects of the nonproliferation question and the implications of Japan's atomic energy development program for Japanese defense policy. Since the technological foundations of a full-fledged civilian atomic energy program and a nuclear weapons program are identical, progress towards the former inevitable entails progress toward the latter. The decision of whether to "go nuclear" in a military sense is primarily a question of political goals and priorities, although it is predicated on an appropriate degree of technological sophistication. Peaceful research and development, however, is tied in most directly to military programs, for the present advanced state of reactor technology has been possible only because of the spin-off from military research programs. Japan has been a willing beneficiary of technological spin-off from the United States, but, in turn, her atomic energy development program has become dependent on this American outflow of technology. While Japan has broadened her contacts with other technologically advanced countries in recent years, the United States is likely to remain in the forefront of atomic technology and will remain a major contributor to the Japanese development program. This closely interwoven relationship between the civilian and military aspects of atomic energy development, on both the national and international levels, is examined in Chapter IX, along with an analysis of the strategic context within which the debate over a Japanese nuclear weapons force is presently taking place.

Chapter X reviews the relationship of technology and politics in Japan from a broad systemic point of view. The impact that atomic technology has had on the Japanese political system is summarized in terms of the success of the system in setting goals, establishing priorities, and allocating resources, and the extent to which there is a continuing and open dialogue on these goals, priorities and allocative decisions.

CHAPTER II

POLICY FORMULATION: THE ADMINISTRATIVE FRAMEWORK

Principles of Policymaking

The administrative framework which was developed for the atomic energy program reflected certain standard bureaucratic features common to Japanese governmental organizations in general. First, the principle of statism was firmly adhered to. Long has commented on the government's role of overlord, and concludes that "science policy is administratively determined. It allows minimum scope for the influence of groups or individuals not identified with administrative participants."[1] Such non-administrative input to the science policymaking process as is solicited, is done so principally through advisory groups of which there are a great number. Long questions the real policymaking function of many of these advisory groups, and suggests that they sometimes perform mainly a public relations service to mask the centralization which does, in fact, exist throughout.[2]

A second principle of administration reflected in the atomic energy agencies is that of collegial leadership. This aspect of the decisionmaking process is reflected not only in formal government agencies but in the advisory groups as well. Few Japanese administrators, businessmen, or scientists stand out as particularly strong figures. As Dimock has noted,

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[1]Theodore Dixon Long, "Science Policy in Postwar Japan: Its Background, Development, and Role in Public Policy and Administration" (unpublished Ph.D. dissertation, Columbia University, 1967), p. 8.

[2]Ibid., p. 390.

in Japan there is "government of positions and not of individuals."[1] Interests are most effectively articulated by representatives who speak for larger bureaucratic constituencies. As a result, the publicized confrontations which occur from time to time between the scientific community or the Diet and the executive branch of government rarely produce solutions to the problems which are raised. As Long has noted, the "confrontation" process is used to identify the point at issue, while the real problem solving and decisionmaking takes place through a more informal process of "negotiation." The tactic, then, becomes to delay action or, at best, modify it. The effect on policy of this sort of leveling is what Long calls "negative acquiescence."[2] Also, since the substance of policymaking occurs in the informal accommodation process which takes place within the collegial leadership body, any actor that does not have access to the collegium has little chance of exerting any significant influence on the decisionmaking process.

This tendency to seek solutions to political disputes by eliminating the controversial aspects of policy proposals is one way to reach administrative decisions, but the consensual output not infrequently contains the seeds of further disagreement and misunderstanding. A case in point is the Japan Atomic Energy Commission (JAEC). The JAEC is a cross between a purely advisory organ, which conservative government leaders preferred, and an independent watchdog body, which was demanded by the opposition. It is responsible to the Prime Minister and depends on the executive for all its

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[1] Marshall E. Dimock, The Japanese Technocracy; Management and Government in Japan (New York: J. Weatherhill, 1968), p. 18.

[2] Long, "Science Policy in Postwar Japan," op. cit., pp. 379-85. See also, Theodore D. Long, "Policy and Politics in Japanese Science," Minerva, VII (Spring, 1969), 446-47.

supportive services, but nevertheless shoulders a legal mandate which implies a self-sufficient and politically independent base of authority.

A third principle of Japanese administrative practice that is reflected in the atomic energy structure is that of departmentalism. Dimock cites this as a "key feature" of the administrative setup, and he criticizes the lack of horizontal contact between agencies.[1] In a system where management is "compulsively thorough" but where decisions must emerge from an extended process of subtle inter-personal consensus seeking, the potential for interminable delay and indecision is quite great.[2] When a broad basis of agreement already exists, as it did in 1954-1955 on the need for establishing an atomic reactor program, administrative problems can be overcome with great speed. However, when there is a desire to delay or avoid decisions, the Japanese administrative system is admirably suited to this purpose as well.

This chapter will describe the principal administrative structures, both in the government and in the business community, through which policy decisions on atomic energy research and development are carried out.

Administrative Framework

The Government

Basic Law for Atomic Energy The Basic Law for Atomic Energy, which went into effect on January 1, 1956, was nearly two years in the making. Anxious to take full advantage of the availability of American hardware and technological know-how under the Atoms for Peace plan, the government hastily initiated a full scale drive in 1954 to lay the foundations of an

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[1]Dimock, The Japanese Technocracy, op. cit., pp. 52-53, 130-40.

[2]Ibid., p. 13.

atomic energy development program. The Economic Planning Agency[1] was directed to begin drafting a plan in March, and a Preparatory Council for the Peaceful Uses of Atomic Energy[2] was established in May by the Cabinet to provide an interchange of ideas at the highest level on budgetary and research priorities among government, business and academic leaders.[3]

The idea of a Japanese atomic energy program drew broad support from all three groups. In June, 1953 the Diet had set up a Science and Technology Council, and in the House of Representatives the following March Nakasone Yasuhiro submitted a bill to provide an additional ¥300 million ($833,000) to the science budget for fiscal 1954, most of it earmarked for reactor development. In four days the House approved ¥235 million ($653,000) "unsolicited by either the administration or scientists."[4]

Enthusiasm within Japanese industry was also running high. Keidanren President Ishikawa Ichiro visited U.S. AEC facilities at the University of California in January, 1954. Soon after, he began to draw together a strong coalition of atomic power proponents from commercial and industrial circles in Japan. The Keidanren was also instrumental in helping to move along rapidly the distended decisionmaking process by bringing together the views

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[1]The Economic Planning Agency (EPA), a part of the Prime Minister's Office (PMO) but administratively within the Ministry of Finance (MOF), has continued to serve as a liaison agency between the PMO, MOF, and Science and Technology Agency (STA) on science policy matters. It does so through its Economic Deliberation Council which was established in 1959. See Long, "Policy and Politics in Japanese Science," op. cit., p. 445.

[2]The Preparatory Council was chaired by Deputy Prime Minister Ogata Taketora with EPA Director Aichi Kiichi as vice-chairman. Other members included the Foreign Minister, Finance Minister, Keidanren president, and Professors Kaya Seiji and Fujioka Yoshio.

[3]Chitoshi Yanaga, Big Business in Japanese Politics (New Haven: Yale University Press, 1968), pp. 180-81.

[4]Ryukichi Imai, "Japan and the Nuclear Age," Bulletin of the Atomic Scientists, XXVI (June, 1970), 37; see also, Yanaga, Big Business, op. cit., pp. 179-80.

of Japanese businessmen, Diet members and cabinet ministers.[1]

Scientific enthusiasm was more guarded,[2] but many scientists, especially atomic physicists, were anxious to pick up the research threads which had been broken by the defeat in 1945. At the Japan Science Council (JSC) Congress in 1951, Professor Fushimi Yasuhiro of Osaka University had urged that the upcoming peace treaty contain no prohibition on nuclear energy in Japan so that a program of research and development on peaceful uses could proceed. At the Congress the following year, Professor Kaya Seiji of Tokyo University suggested that Japan set up an Atomic Energy Commission. The Congress, at that time, established the JSC 36th Committee, a forerunner of the Committee on Atomic Energy Problems.[3]

By October, 1955 the government bill, based on an Economic Planning Agency draft, was ready. The EPA had earlier cleared it with the Political Affairs Research Committee of the ruling Democratic Party,[4] but there was no overall agreement on the draft even within the government. The Preparatory Council for the Peaceful Uses of Atomic Energy in the Cabinet feared that, due to urgings by the EPA and the Diet to hurry along the planning, Japan might end up importing all its nuclear technology from abroad to the detriment of domestic research and development.[5] The government plan called for somewhat over ¥5 billion ($14.9 million) investment in

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[1] Yanaga, Big Business, op. cit., pp. 179, 181.

[2] For instance, the Japan Science Council opposed Representative Nakasone's supplemental atomic energy budget proposal in March, 1954 because its members felt that there had been insufficient planning on the specific course research and development was to take.

[3] Yanaga, Big Business, op. cit., pp. 178-80.

[4] Nihon Keizai, Sep. 20, 1955 in Daily Summary of the Japanese Press (hereafter cited as DSJP), Sep. 20, 1955, p. 5.

[5] Asahi Shimbun, Sep. 26, 1955 in DSJP, Sep. 27, 1955, p. 9.

atomic energy research and development the first year with a total five year expenditure of ¥30 billion ($83.3 million).[1] The MOF was thinking in terms of a much more limited government investment and suggested ¥3 billion ($8.3 million) for the first year.[2]

The Diet bill, introduced under joint sponsorship of government and opposition parties,[3] was more comprehensive than any proposal from the executive branch. Nakasone, chairman of the recently created fourteen-member Joint Committee on Atomic Energy, proposed an initial investment of ¥8 billion ($22.2 million) the first year, considerably above the EPA or MOF figures.[4] Also, the Diet bill, unlike the government version, called for building a domestic power generation reactor in addition to importing two experimental reactors.[5] The bill's sponsors had just attended the Geneva Conference on the Peaceful Uses of Atomic Energy and were most impressed with plans for power generation in Western European countries. They insisted that Japan should make every effort to catch up in this field as quickly as possible.[6]

The Japanese were determined to catch up with the West in this critical new venture, and they frequently spoke in terms of an atomic "race" in these early years. The concept of a "race" was rooted in modern Japanese history.

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[1] Nihon Keizai, Sep. 20, 1955 in DSJP, Sep. 20, 1955, p. 5; and Oct. 11, 1955 in DSJP, Oct. 11, 1955, p. 8.

[2] Nihon Keizai, Nov. 30, 1955 in DSJP, Nov. 30, 1955, p. 10.

[3] The sponsors were Nakasone Yasuhiro (Democratic Party), Maeda Masao (Liberal Party), Shimura Shigeji (Japan Socialist Party), and Matsumae Shigeyoshi (Democratic Socialist Party).

[4] Nihon Keizai, Nov. 30, 1955 in DSJP, Nov. 30, 1955, p. 10.

[5] Nihon Keizai, Sep. 20, 1955 in DSJP, Sep. 20, 1955, p. 5.

[6] Tokyo Shimbun, Sep. 26, 1955 in DSJP, Sep. 27, 1955, p. 14.

Quite early in the Meiji era the Japanese became aware of their technological inferiority. The experience of China at the hands of the Europeans was taken as proof of the need for Japan to catch up with the West as quickly as possible. Again, after World War II, as Long has noted, scientific research was strongly imbued with a sense of recovering lost ground. Moreover, Japanese scientists have had an image of Western science free from governmental interference, which they feel gives it an automatic advantage over Japanese research. Long concludes that the Japanese have imposed upon themselves an "artificial standard" of catching up.[1]

On November 5 the Diet Joint Committee agreed with the Prime Minister on a compromise plan which was quickly passed by the Diet. It provided for an Atomic Energy Commission within the Cabinet to advise the Prime Minister and for a Joint Committee on Atomic Energy in the Diet to make policy recommendations to the government. Additionally, a Science and Technology Agency, one of the most controversial aspects of the administrative machinery, was charged with coordinating a host of diverse programs among government ministries and agencies. The plan also called for a new atomic energy research corporation and for a fuel mining and refining corporation.[2] An overall budget figure of ¥3.6 billion ($10 million) for 1956 was agreed upon by the Cabinet at this time.[3] Besides the two imported research reactors and a domestic power reactor already mentioned, the bill provided for sizeable training, fuel prospecting, and radioisotope research programs.[4]

On December 15, 1955 the new compromise atomic energy bill was

[1]Long, "Science Policy in Postwar Japan," _op. cit._, pp. 15-16.

[2]_Asahi Shimbun_, Nov. 6, 1955 in _DSJP_, Nov. 7, 1955, p. 8.

[3]_Yomiuri Shimbun_, Jan. 20, 1956 in _DSJP_, Jan. 20, 1956, p. 5.

[4]_Nihon Keizai_, Jan. 1, 1956 in _DSJP_, Jan. 1, 1956, p. 4.

introduced into the Twenty-third Extraordinary Session of the Japanese Diet. The measure now had broad support within the government and both legislative houses. Objections that the bill should be considered more fully at a regular session were ignored.[1] The bill was officially approved at the Diet on December 18 and took effect on January 1, 1956. Later that month, supporting bills for the Japan Atomic Energy Research Institute (JAERI) and the Atomic Fuel Corporation were introduced.[2]

Government agencies The administrative framework established by the Basic Law in 1956 has stood without significant change to the present time. The objectives of the Basic Law, as stated in Article 1, are "to secure energy resources in the future," "to achieve the progress of science and technology," and to promote atomic industry with the goal of contributing "to the welfare of mankind and to the elevation of the national living standard."[3]

The mandate given the government, to foster "research, development and utilization of atomic energy" (Article 1, Basic Law), is very broad when one considers that the definition of "atomic energy" covers "all kinds of energy released from atomic nuclei in the process of nuclear transformation" (Article 3(i), Basic Law). The Japan Science Council objected to opening the door so widely to government supervision and tried unsuccessfully in 1955 to have the Basic Law reworded.[4] The Science Council has maintained steady pressure on the government to restrict direct intervention into

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[1] Tokyo Times, Dec. 14, 1955 in DSJP, Dec. 14, 1955, p. 2.

[2] Yanaga, Big Business, op. cit., pp. 192-94.

[3] Atomic Energy Bureau, Atomic Energy Laws of Japan: The Atomic Energy Basic Law (Tokyo: Science and Technology Agency, n.d.), pp. 12.

[4] Mainichi Shimbun, Dec. 14, 1955 in DSJP, Dec. 14, 1955, p. 3.

scientific endeavors, and it has been quick to take umbrage at any move it considered threatening to the freedom of scientific research. The Science Council has not been entirely satisfied that the basic policies enunciated in the 1956 act[1] are always as closely observed by the government as it would like.

Atomic Energy Commission.--Atomic energy development in Japan is centered in the Prime Minister's Office.[2] The Prime Minister appoints all major atomic energy officials and approves budgets and programs. He is advised by an Atomic Energy Commission appointed by him with the approval of the Diet.[3] The JAEC was designed to reflect the views of the public while taking into account the opinions of organized interest groups.[4] The first Commission, for instance, was headed by Shoriki Matsutaro, a prominent businessman who had attained national recognition as a major proponent of atomic energy development. Four other commissioners were chosen to represent business (Ishikawa Ichiro), labor (Arisawa Hiromi), and the academic community (atomic physicists Yukawa Hideki and Fujioka Yoshio). In 1959 two additional commissioners were added, one in the field of biology and one in law. All members of the JAEC are supposed to be internationally recognized

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[1]Independent research, democratic management, and public announcement of research results; see Basic Law, Article 2.

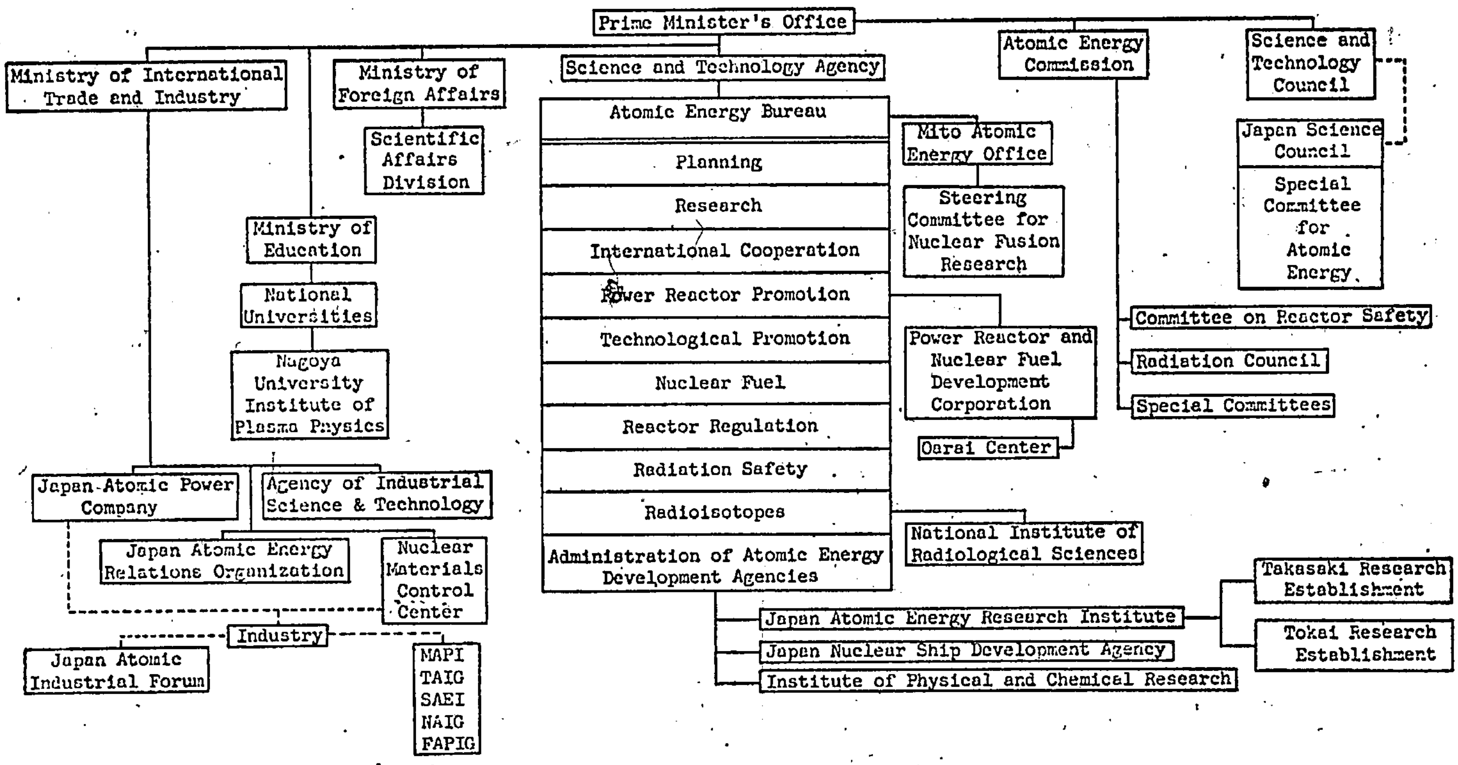
[2]Dimock notes that in recent years administrative authority has steadily accrued to the PMO. In 1967, for instance, approximately 30 per cent of all executive branch employees (some 300,000 people) were responsible to the PMO directly. See his The Japanese Technocracy, op. cit., p. 48.

[3]Organization for Economic Cooperation and Development, Nuclear Legislation (Paris: European Nuclear Energy Agency, 1969), pp. 117-18.

[4]John E. Hodgetts, Administering the Atom for Peace (New York: Atherton, 1964), p. 59.

CHART 2

ATOMIC ENERGY RESEARCH AND DEVELOPMENT IN JAPAN
ORGANIZATIONAL CHART



in their fields, to have no particular political ambitions, and to have a sound understanding of the issues surrounding atomic energy in Japan.[1]

The JAEC's mandate was the result of a compromise reached between the Diet and the government during the discussions that took place at the end of 1955. While the government preferred a purely advisory body, the Diet argued for an independent organ which could retain more continuity of policy and not be subject to the constant pulling and hauling of partisan politics. The Commission was thus placed within the Office of the Prime Minister but with something more than a purely advisory status.[2] This is reflected in the provision that when the JAEC makes reports on its decisions, the "Prime Minister . . . shall pay due consideration to it."[3]

Science and Technology Agency.--The Science and Technology Agency is the heart of the atomic energy administrative framework in Japan. It was established by law on March 31, 1956 and its director, who also serves as Chairman of the Atomic Energy Commission, has cabinet rank. The STA's Atomic Energy Bureau, with its ten divisions, is where most of the administrative threads come together.

There was considerable discussion in 1954 and 1955 over the form the STA should take. Keidanren, and business circles generally, wanted centralized supervision of science and technology programs but preferred not to have any ministry currently in existence absorb such wide

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[1]Mainichi Shimbun, Dec. 23, 1955 in DSJP, Dec. 24, 1955, p. 16; and Atoms in Japan, III (September, 1959), 27.

[2]Yanaga, Big Business, op. cit., pp. 193-94.

[3]Atomic Energy Bureau, Atomic Energy Laws of Japan, op. cit., Article 3.

authority.[1] The Ministry of International Trade and Industry (MITI), fearful of losing a number of its sections in the reorganization, opposed the idea of a new agency altogether.[2] The Joint Diet Committee hoped to transcend the vicissitudes of party politics by putting the entire apparatus within the Prime Minister's Office but, in effect, independent of the Prime Minister. The Liberal Democratic Party (LDP) Policy Affairs Research Committee, however, posed "absolute opposition" to giving the agency any such freedom from party review.[3] The Japan Science Council went on record as opposing the STA as a "backward step."[4] However, this opposition came principally from those in the social sciences and humanities, while scientists in the engineering and pure science sections of the JSC tended to see the new agency as a welcome forum for their own ideas.[5]

The STA acts as a secretariat for the JAEC and is charged with coordinating long range plans and research programs, compiling the research budget, and supervising national laboratories.[6] Its duties encompass the entire gamit of atomic energy policymaking including supervising training programs, screening government subsidies and contracts, publicizing atomic energy programs, devising protective measures to guard against radiation

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[1] Yanaga, Big Business, op. cit., p. 189.

[2] Tokyo Shimbun, Nov. 7, 1955 in DSJP, Nov. 7, 1955, p. 10.

[3] Asahi Shimbun, Dec. 7, 1955 in DSJP, Dec. 7, 1955, p. 15.

[4] Japan Science Council, Annual Report, 1959, p. 49, cited by Theodore D. Long, "Science Policy in Postwar Japan," op. cit., p. 348.

[5] Ibid., pp. 349-50.

[6] Long, "Policy and Politics in Japanese Science," op. cit., p. 439. The atomic energy laboratories include the National Institute of Radiological Science, the Japan Atomic Energy Research Institute, the Power Reactor and Nuclear Fuel Development Corporation, and the Nuclear Ship Development Agency.

hazards, and managing the nuclear liability program.[1]

Japan Atomic Energy Research Institute.--The Japan Atomic Energy Research Institute was set up in June, 1956 as a special corporation. As in the case of the JAEC and the STA, JAERI's organizational mandate was the result of bureaucratic compromise. The Diet Joint Committee on Atomic Energy had preferred a public corporation free of political interference.[2] Opposition arose in LDP circles, however, to the idea of an autonomous agency. The Ministry of Finance also objected to investing funds from the government budget in an agency which would not be directly answerable to the government. The Keidanren opposed any format which would not allow its private shareholders a voice in policymaking. Under a compromise plan JAERI was set up as a special corporation under direct government supervision but with independent control of its own funding and personnel.[3] By distinguishing JAERI from regular civil service employees, JAERI could offer higher salaries to attract experts which might otherwise be siphoned off by industry. It was also hoped that this extra margin of autonomy would facilitate cooperation between industry and JAERI personnel.[4] JAERI is run by a board of directors headed by a president from the scientific community and a vice president drawn from the government. An initial

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[1] OECD, Nuclear Legislation, op. cit., pp. 119-20.

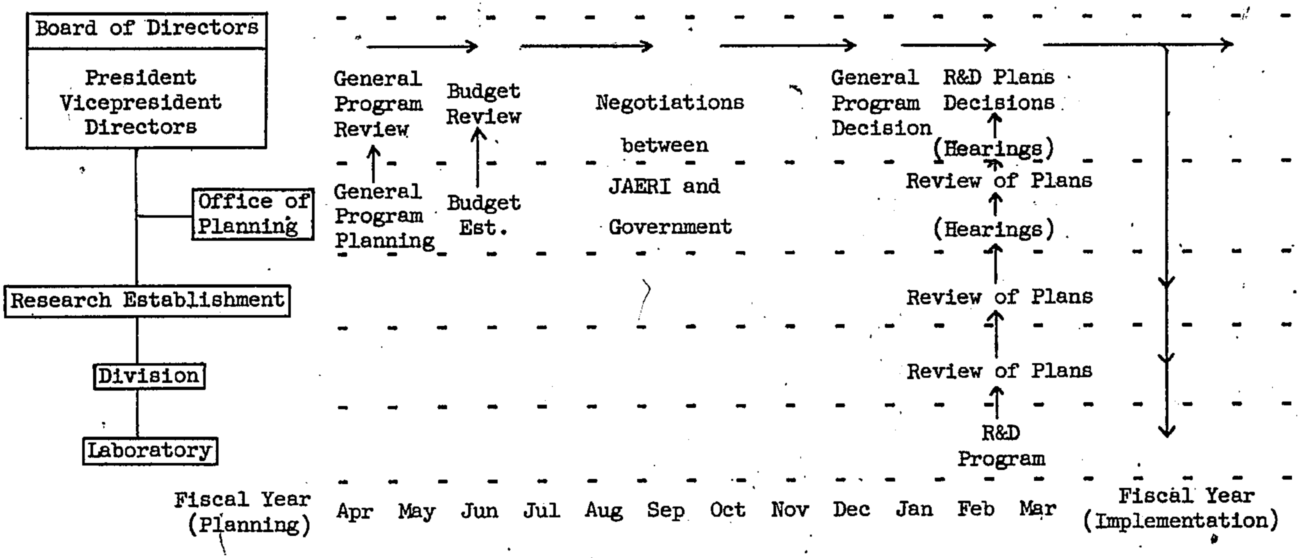
[2] "Government-Affiliated Agencies," Oriental Economist, XXXIV (November, 1966), 662-66 and Oriental Economist, XXXIV (December, 1966), 715-20.

[3] Yanaga, Big Business, op. cit., p. 198; Mainichi Shimbun, Feb. 1, 1956 in DSJP, Feb. 1, 1956, p. 3; Yomiuri Shimbun, Feb. 5, 1956 in DSJP, Feb. 6, 1956, p. 13; and Mainichi Shimbun, Feb. 7, 1956 in DSJP, Feb. 7, 1956, p. 7.

[4] Hodgetts, Administering the Atom for Peace, op. cit., p. 60.

CHART 3

RESEARCH AND DEVELOPMENT DECISIONMAKING FLOW
JAPAN ATOMIC ENERGY RESEARCH INSTITUTE



Source: Matsui Takashi, private interview held at the Embassy of Japan, Washington, D. C., April 27, 1972.

government investment of ¥250 million ($694,000) was made with private industry adding ¥248 million ($689,000).[1]

Despite its prestige as the government's primary atomic energy research agency, JAERI has, on occasion, found itself competing both with industry and the government for personnel and money. The JAEC has sometimes been lukewarm in advocating government research projects. Too often the JAEC has preferred to leave atomic energy research and development to private industry, especially in the areas of applied research.[2] JAERI has also found its long range research goals, designed to achieve across-the-board technological autonomy for Japan, frustrated by industry's desire to import the latest technology from abroad in order to keep Japan's power generation facilities on a par with developments elsewhere.[3]

In the fall of 1963 a rather serious debate broke out within JAERI. Government spokesmen tried to bill it as a simple labor-management dispute, but the heart of the dissatisfaction among JAERI scientists and engineers lay in the failure of the government to outline clear research goals for the Institute. It was felt that the government generally did not appreciate the need for basic research. This lack of concern was reflected in the atomic energy budget which allocated generous funds to reactor development but scrimped on manpower training and research. Since JAERI did not have the benefit of technological spin-off from defense programs which proved so valuable to its counterparts in other countries, JAERI scientists pleaded for closer cooperation between their own research activities and the power reactor development program. This disruption in JAERI's activities brought

[1]Yanaga, Big Business, op. cit., p. 198.

[2]Atoms in Japan, IX (March, 1965), 6-7.

[3]Hodgetts, Administering the Atom for Peace, op. cit., p. 112.

about a change of personnel at the upper echelons and a reorganization designed to give more decisionmaking authority to the department chiefs.[1] Despite administrative readjustments, JAERI must still compete for money within the government bureaucracy and attempt to hold its own with an industrial sector that is making impressive strides in electric power generation.

Consultative agencies In addition to the principal administrative agencies, there are two consultative groups which assist the Prime Minister and his atomic energy advisors in policymaking.

Radiation Council.--The Radiation Council was established in 1961 to consider protective measures against the increase of radioactivity from atmospheric and underground nuclear weapons testing. The Council provides technical advice to the Prime Minister through the Director-General of the STA. The Radiation Council considers all ramifications of radiation protection, and much of its present work involves examination of safety measures for the many industrial, medical, agricultural, and educational institutions that are working in various fields of radiation application and research. As of 1969, there were 1,835 such facilities. The members of the Council, which may number up to thirty, are nominated by the STA Director-General and approved by the Diet for two year terms. Radiation Council decisions are carried out by Cabinet Orders.[2]

Committee on Reactor Safety.--The Committee on Reactor Safety was

[1] Atoms in Japan, IV (April, 1965), 1-3.

[2] OECD, Nuclear Legislation, op. cit., p. 120; and Japan Atomic Energy Commission, Fourteenth Annual Report: 1969-1970 (Tokyo: Japan Atomic Energy Commission, n.d.), pp. 92-93.

created in October, 1968 as a consultative body to the Chairman of the JAEC. A great number of reactors are scheduled to go into operation in the 1970s, and the public was beginning to become actively concerned over the siting of these facilities. Also, the advanced thermal and fast breeder generations of reactors demand special safety consideration due to their increased size and experimental nature. The Committee is responsible both for establishing the safety criteria to be met by all applicants seeking a reactor operation permit, and for approving the application for an actual reactor installation at a specific site. The Committee of up to thirty members is nominated by the Prime Minister and approved by the Diet.[1]

Special agencies There are also four special agencies which are engaged in selected projects relating to atomic energy.

Power Reactor and Nuclear Fuel Development Corporation.--The Power Reactor and Nuclear Fuel Development Corporation (PNC) was created in July, 1967 to oversee the ATR-FBR[2] program. It was also given the task of administering the nuclear fuel program which had been under the Atomic Fuel Corporation since 1956. The Chairman of the PNC is appointed by the Prime Minister in consultation with the JAEC. The PNC is directly administered by the Atomic Energy Bureau of the STA.[3]

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[1]OECD, Nuclear Legislation, op. cit., p. 120; and JAEC, Fourteenth Annual Report, op. cit., pp. 82-83.

[2]Advanced Thermal Reactor-Fast Breeder Reactor

[3]OECD, Nuclear Legislation, op. cit., pp. 123-24; Atoms in Japan, X (April, 1966), 1-3; Atoms in Japan, X (June, 1966), 21; Atoms in Japan, XI (August, 1967), 2-3; and Tokyo Shimbun, Nov. 15, 1967 in DSJP, Nov. 22, 1967, pp. 37-38.

National Institute of Radiological Sciences.--The National Institute of Radiological Sciences (NIRS) was created in 1957 to study the medical effects of radiation. The NIRS operates with both government and private funds. Although it is attached to the Atomic Energy Bureau, it has legal corporation status so that it is not directly under government administrative or budgetary control.[1]

Institute of Physical and Chemical Research.--The Institute of Physical and Chemical Research (IPCR) began scientific research programs with an imperial family grant in 1916 and is currently administered by the STA. Its chairman is appointed by the Prime Minister for a four year term. At the present time, the IPCR is divided into eight research groups, one of which is nuclear physics.[2]

Nuclear Ship Development Agency.--The Japan Nuclear Ship Development Agency (JNSDA) was established in 1963 to direct the construction and launching of Japan's first nuclear-propelled merchant vessel. The ship, christened "Mutsu," was launched in June, 1969 and is expected to be fully operational by the mid-1970s. The JNSDA let contracts on the project to Ishikawajima-Harima Heavy Industry Company for the construction of the ship and to Mitsubishi Atomic Power Industries for the reactor component. If the "Mutsu" project is successful, as expected, the government intends to diminish its role in future construction and leave private industry as the "main constituent."[3]

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[1] OECD, Nuclear Legislation, op. cit., p. 121.

[2] Ibid., p. 125; and Long, "Science Policy in Postwar Japan," op. cit., pp. 75-76.

[3] JAEC, Fourteenth Annual Report, op. cit., pp. 49-56.

Science and Technology Council and the Japan Science Council The administrative setup has not been entirely successful. In 1957, the government began discussing ways to improve planning and to encourage scientific development generally in Japan.[1] The result was the creation, in 1959, of the Science and Technology Council (STC). The STC was formed to oversee the organizational and administrative aspects of government science programs. It was hailed at the time by science policy administrators within the Science and Technology Agency as new evidence of the government's concern for science and technology. The STC, it was claimed, would encourage cross-contact between government and business, and spur scientific research and development in both sectors. In fact, the STC has had little impact on science policy. There was some debate in 1959 over whether the group should set its research and development goals independently of the government, or whether it should tailor programs to fit the budget.[2] The STC drew up an ambitious ten-year promotion scheme in 1960 to complement the government's own national income doubling plan, but lacking the resources to carry through its concept, the plan disintegrated quietly while undergoing review.[3] The STC has had little political influence since that day. The Science and Technology Council undertakes studies when requested by the Prime Minister who acts as chairman of the group.[4] The STC

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[1]Tetu Hirosige, "The Role of the Government in the Development of Science," Journal of World History, IX (1965), 338.

[2]Tokyo Shimbun, May 15, 1959 in DSJP, May 15, 1959, p. 16.

[3]Hirosige, "The Role of the Government," op. cit., p. 338.

[4]Other members of the STC are the Minister of Education, Minister of Finance, Director of the Economic Planning Agency, Director of the Science and Technology Agency, and the President of the Japan Science Council plus five scientists and engineers appointed by the Prime Minister with the concurrence of the Diet.

is really a government in-house review body which provides "sympathetic scientific advice."[1] It was set up in part to act as a buffer between the government and the Japan Science Council.

The Japan Science Council was established in 1949 "to guide and coordinate the development of science and technology in Japan and at the same time provide a sound democratic governmental structure."[2] The 210 members of the JSC are divided into seven sections by academic discipline.[3] The Science Council, especially the humanities and social sciences sections, has often been highly critical of conservative Japanese governments. Partly this is a result of different political philosophies, but also there is often a clash between what the government seeks to accomplish in the short run and what the JSC feels is best for the long range development of science in Japan. Thus, the Science and Technology Council was created to avoid direct government confrontation with the JSC. The scientific community expressed misgivings about the STC when it was first proposed in 1957,[4] and their concerns were echoed by the socialists who opposed further "bureau-

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[1] Long, "Science Policy in Postwar Japan," op. cit., p. 154.

[2] Harry C. Kelly, "A Survey of Japanese Science," Scientific Monthly, LXVIII (January, 1949), 42.

[3] The JSC sections are listed by Yoshida Tomizo, "Organization of Scientific Activities," in Science in Japan, edited by Arthur H. Livermore (Washington: Association for the Advancement of Science, 1965), pp. 2-3. They are:

Section 1:	Literature, Philosophy, Pedagogy, Psychology, Sociology, History
Section 2:	Law, Political Science
Section 3:	Economics, Commerce, Business Education
Section 4:	Pure Science
Section 5:	Engineering
Section 6:	Agriculture
Section 7:	Medicine, Dentistry, Pharmacology

[4] Hirosige, "The Role of the Government," op. cit., p. 338.

cratic intervention" of the government in scientific research.[1] It has been pointed out that the Science and Technology Council is hardly an independent source of scientific opinion, staffed as it is largely by government officials and dependent on the STA Planning Bureau for its secretariat.[2]

Administrative reform The administrative framework within which decisionmaking on atomic energy policy proceeds has been subject to certain stresses and strains. Partly, this is inevitable by virtue of certain inherent characteristics of the Japanese bureaucratic system. The compartmentalization of administrative units is "conducive to stalemate" in the opinion of one student of Japanese decisionmaking.[3] Horizontal contact between units is limited, but at the same time, collectivity and consensus are most important if decisions are to have any practical effect. Ettiquette demands, also, that consideration be given individual opinions. While no one openly dominates the decisionmaking process and all views are aired, opinions must somehow assume weight in proportion to the personal stature and formal office of the opinion holder. Attaining the correct mix of individual and departmental inputs in the face of legalistic and elitest concepts of bureaucratic interaction can be very time consuming. It also tends to produce a leveling out of decisionmaking alternatives to give a product which, while it may be the least objectionable to all concerned,

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[1]Tokyo Shimbun, May 15, 1969 in DSJP, May 15, 1959 and December 3, 1959 in DSJP, Dec. 3, 1959, p. 17.

[2]Long, "Policy and Politics in Japanese Science," op. cit., pp. 441-42; and Long, "Science Policy in Postwar Japan," op. cit., pp. 154-55.

[3]James W. Morley, "Economic and Balanced Defense," in Forecast for Japan: Security in the 1970s, ed. by James W. Morley (Princeton: Princeton University Press, 1972), pp. 26-30.

and indeed, may be the only "workable" solution, is not necessarily the most efficient.[1]

Administrative reform has been tried in recent years with varying success. In July, 1967 the Diet passed a resolution calling for reexamination of the atomic energy decisionmaking process. The JAEC, it was charged, had failed as a planning and coordinating organ. A reform committee drawn from government, business, and academic ranks was formed under the direction of JAEC Acting Chairman Arisawa, but it did nothing to change the formal organizational structure of the JAEC and related agencies. Besides urging more thorough government coordination, the committee's report recommended only that specialist boards be created within the JAEC and that a survey sub-committee be created in the Reactor Safety Committee to speed the screening of proposed reactor projects.[2]

Administrative reform is taking place, especially in technological areas which require more imaginative and novel decisionmaking, if for no other reason than the lack of established bureaucratic channels. Long range planning, broadening of participation in decisionmaking to line organizations, incorporating the views of local government, and soliciting inputs from labor and consumer units are all examples of administrative reforms that are taking place in the day-to-day operation of Japanese atomic energy bureaucracies. It seems likely that formal administrative reorganization, if and when it occurs, will be in response to this kind of working change rather than responsible for it.

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[1]See discussions in Dimock, The Japanese Technocracy, op. cit., pp. 1-60; and Yoshinori Ide, "Administrative Reform and Innovation: the Japanese Case," International Social Science Journal, XXI (1969), 56-57.

[2]Atoms in Japan, XIII (July, 1969), 3.

Private Industry

One of the most fundamental influences that the rapid blossoming of science and technology has had on modern societies is the blurring of traditional distinctions between the private and public economic sectors. Perhaps in no other endeavor is the intermingling of resources held in common with those reserved for private exploitation more evident than in the development of atomic energy. In no country has there been any serious contention that private enterprise could, or even ought to, lay claim to the atom as a purely economic resource.

The dual character of atomic energy was widely acknowledged by the Japanese public in an opinion poll taken in 1955. When asked what form of atomic energy organization they preferred, 45 per cent of the interviewees called for a joint government-private enterprise system. Eighteen per cent suggested complete government control while only three per cent felt the atom should be turned over completely to business.[1] Such dual partnership has been common in Japan since the 19th century. A recent study suggests that up to 40 per cent of Japan's economic activity is generated by staterun public corporations.[2] To make a sharp distinction between private and public sectors, however, is to impose a dichotomy where the Japanese, at least, do not see one. As a "top government official" recently observed, ". . . in Japan 'public' and 'private' are the same."[3]

<u>Atomic industry organization</u> Japanese private industry has been a dedicated proponent of atomic power generation. Following President

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[1] <u>Yomiuri Shimbun</u>, Aug. 15, 1955 in <u>DSJP</u>, Aug. 16, 1955, p. 11.

[2] Dimock, <u>The Japanese Technocracy</u>, <u>op</u>. <u>cit</u>., pp. 59-60.

[3] <u>Ibid</u>., p. 12.

Eisenhower's Atoms for Peace pronouncement in December, 1953, the United States made known its intention to assist Japan in developing atomic power. Although Japanese business leaders welcomed the American initiative, they realized that such an undertaking would require close coordination both within Japanese private industry and between private industry and the government.

Under the sponsorship of Shoriki Matsutaro, owner of the influential Yomiuri Shimbun, the Keidanren formed an Atomic Energy Utilization Council in April, 1955 to discuss the organization of a national atomic energy program.[1] It was suggested in the press that a secondary objective of the Council was to forestall any attempt by more cautious groups, mainly in academic circles and the political left wing, to place a damper on atomic energy development. Shoriki, speaking with government officials at the time, was reported to have argued that atomic energy was too important to be left to the physicists, and that Japan should accept American offers of uranium immediately so as not to be left behind other countries in the race for atomic power generation.[2]

At a JAEC meeting in January, 1956 Shoriki proposed an Atomic Industrial Forum, fashioned after the American organization of the same name. Its purpose would be to coordinate industry-wide research and development. The following month, over sixty of Japan's business leaders met with Shoriki at the Prime Minister's residence, and a committee of fourteen was appointed to establish the outline of the Forum. On March 1,

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[1]Yomiuri Shimbun, April 27, 1955 in DSJP, April 27, 1955, p.9.

[2]Mainichi Shimbun, May 5, 1955 in DSJP, May 5, 1955, p. 15; and Feb. 3, 1956 in DSJP, Feb. 3, 1956, p. 14.

the Japan Atomic Industrial Forum (JAIF) was officially launched with an initial membership of 350 firms.[1] Suga Reinosuke of the Tokyo Electric Power Company was elected JAIF Chairman.[2]

In addition to the JAIF, an "atomic energy federation" for Japanese industry as a whole,[3] the firms which were to be most directly involved in the manufacture of atomic reactors and associated equipment also organized themselves into five industrial consortia and immediately began contracting with firms in the United States and Great Britain for importation of reactors and joint development projects in Japan.[4] Three of these combines were based on pre-war zaibatsu companies (Mitsubishi, Sumitomo, and Mitsui) while the other two were organized around other industrial giants (Hitachi and Fuji Electric) and banking firms (Fuji, Sanwa, and Dai-ichi). The organization of these consortia is shown below.

Government-industry partnership While both government and business in Japan fully supported the idea of joint public-private investment in atomic energy development, there was no general agreement on a specific division of labor. The electric power companies proposed the creation of a new corporation, controlled by private business, to import and operate power reactors.[5] With government financial support and the assistance of JAERI, they argued, private industry could do the job. They expected to make a profit from atomic reactors by 1962. Within the government, however, there

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[1] Yanaga, Big Business, op. cit., pp. 194-96.

[2] Embassy of Japan, Japan Report, II (April 17, 1956), 10.

[3] Yomuiri Shimbun, Jan. 22, 1956 in DSJP, Jan. 23, 1956, p. 1.

[4] Asahi Shimbun, Jan. 17, 1956 in DSJP, Jan. 17, 1956, p. 12.

[5] There are nine regional electric power companies in Japan: Hokkaido, Tohoku, Tokyo, Chubu, Hokuriku, Kansai, Chugoku, Shikoku, and Kyushu.

CHART 4

ATOMIC ENERGY INDUSTRIAL CONSORTIA

Name	Acronym	Date Organized	Principal Companies	Number of Companies 1957	Number of Companies 1969
Mitsubishi Atomic Power Industries (Mitsubishi Group)	MAPI	10-11-55	Mistubishi	20	25
Tokyo Atomic Industrial Group (Tokyo Group)	TAIG	3-26-56	Hitachi Marubini-Iida Fuji Bank Sanwa Bank Showa Denko K.K.	27	27
Sumitomo Atomic Energy Industries (Sumitomo Group)	SAEI	4-15-56	Sumitomo Matsushita	14	39
Nippon Atomic Industry Group (Mistui Group)	NAIG	6-8-56	Mitsui Tokyo Shibaura Ishikawajima-Harima Japan Steel	30	36
First Atomic Power Industry Group (Dai-ichi Group)	FAPIG	8-23-56	Dai-ichi Bank Fuji Electric Kawasaki Group Furukawa Group	25	23

Source: Atoms in Japan, Vol. I (May, 1957), 19-22; Vol. IX (January, 1965), 10-14; and Nuclear Engineering International, Vol. XIV (May, 1969), facing p. 404.

was a strong disinclination to give private business, and the utility companies in particular, a completely free hand. JAERI scientists, for instance, feared that with the reactor program entirely in private hands the profit motive would overshadow long range national interests, and too much reliance would be placed on proven foreign-made equipment at the expense of a strong domestic research and development program. The Electric Power Development Company, a 99 per cent government-owned corporation established in 1952 to encourage electric power expansion, felt that the risks inherent in an experimental reactor program made government investment imperative.[1]

Government and business negotiators reached a compromise in the form of the Atomic Power Development Company. Under this arrangement, atomic energy power generation development would proceed under the direction of private business, but with a degree of government regulation through the Electric Power Development Company. A 70:30 private-public investment ratio was suggested, but this was challenged by the Finance Ministry which felt that the 15 per cent scheduled to come from JAERI was too high for a research oriented agency. Thus, the government's share of investment was cut to 20 per cent.[2]

Over the years, the atomic energy industry has looked to the government for assistance in four major areas. First, the government has been relied upon as a source of research and development funds and training programs, largely through JAERI. Responsibility for developing chancy ventures should be assumed by the government, the thinking goes, and once proven successful the projects should be turned over to private enterprise. Second, private

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[1] Atoms in Japan, I (May, 1957), 2-4; Atoms in Japan, I (July, 1957), 1-2; and "Japan's Power Feud Enters Nuclear Arena," Electrical World, CLXVI (August 8, 1966), 50.

[2] Atoms in Japan, I (July, 1957), 3; Atoms in Japan, I (August, 1957), 1.

industry has frequently expected the government to help offset cost differentials of a temporary nature. Private firms have asked for public funds to help defray the costs of building atomic power plants, importing fuels not yet competitive with oil, and purchasing spent fuel for storage until later generations of reactors are in operation and can use the material. Third, private industry has looked to the government for infant industry support in the form of tax preferences, special depreciation allowances, and low interest bearing, long term loans. Finally, the government has been expected to provide a favorable atmosphere in foreign countries for agreements to support the domestic atomic industrial program. Stabilizing resource supply and ensuring technology imports are particularly important.[1]

One should not conclude, however, that private investment has been lacking or halfhearted. A recent estimate placed the total private investment in atomic energy from 1956 to 1966 at ¥120 billion ($333 million). This is more than 20 per cent above the amount the government invested over the same period.[2] Moreover, the proportion of expenditures in the private sphere should increase sharply from now on, due to the rapidly expanding reactor program scheduled for the 1970s and 1980s. For instance, two industry-wide studies recently showed that the share of private industry in research and development rose from 31 per cent in fiscal year 1967 to nearly 36 per cent in fiscal year 1968.[3] The decision

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[1] Atoms in Japan, VI (July, 1962), 1-3; Atoms in Japan, XIII (March, 1969), 29-30; Asahi Shimbun, Aug. 30, 1955 in DSJP, Aug. 30, 1955, p. 6; JAEC, Fourteenth Annual Report, op. cit., pp. 38-39.

[2] Sankei Shimbun, Feb. 23, 1968 in DSJP, Feb. 23, 1968, p. 33.

[3] Atoms in Japan, XIII (April, 1969), 35-36; and Atoms in Japan, XIII (November, 1969), 16-17.

by the MOF Foreign Investment Council to lift import controls in nuclear energy areas in July, 1972[1] should also spur additional activity by industry.

Administrative Centralization with Bureaucratic Balance

This overview of the administrative organization of atomic energy development in Japan makes clear that the structures devised to handle new and complex technological policy problems have been dealt with along traditional bureaucratic lines. The central government was given a mandate over all aspects of research, development, and utilization of the atom. Decisionmaking authority is centered in the Prime Minister's Office with little opportunity for independent policy action on the part of the JAEC or the STA.

The commanding formal position of the government is tempered to some extent by the felt need for consensus seeking through a less formal negotiation procedure. *Ad hoc* committees and study groups are frequently used to solicit the views of Diet members, scientists, and business leaders. Contacts with the business community are especially significant, since Japanese business organizations act as the conduit through which technology is developed and filtered through all levels of economic activity. The realization that Japan must guarantee itself continuing access to the latest technological developments, or in more traditional terminology, that Japan must catch up with the West, has been the unifying principle by which the national atomic energy program has achieved such rapid success. Since this primary goal can be achieved only through full working partnership between government and business, the boundaries between politics and economics,

[1] *Japan Times Weekly*, July 1, 1972, p. 9.

never very sharp in Japan, have been eroded even further. The reactor development program has gone forward under the direction of private industry, while the government has provided indispensable support in the form of research, investment back-up, infant industry support, and diplomatic groundwork.

The most obvious vacuum in the administrative picture is in the area of independent scientific input. The Japan Science Council, formed under the Occupation as a source of democratic scientific opinion, has been sidetracked. When the Science Council refused to play simply an in-house consultative role, the Science and Technology Council was established as a buffer between the highest level of decisionmakers and the scientific community. The differences between the government and the Science Council are partly the result of conflicting interpretations on social priorities. Where the government would assign priority to meeting immediate energy demands, the scientific community would look more favorably on building up Japan's basic research capabilities. However, the differences in perception of the role technology should play goes far beyond the question of allocating resources. The root of the conflict stems from disagreement over fundamental societal goals, both domestic and in the area of foreign policy. These issues will be dealt with at greater length in Chapter VII.

CHAPTER III

POLICY FORMULATION: PLANNING

Planning as a Political Function

If one principle can be said to summarize the essence of planning in the Japanese atomic energy development program, it is the observation made by Eugene Skolnikoff that the "technical nature of an issue is not always a good indicator of the actual importance or relevance of technical considerations of specific facets of the subject."[1] From its beginnings in 1955 the atomic energy program has been shaped to a much greater extent by administrative, budgetary and foreign policy considerations than it has by technology in a strict sense.

The Japanese development program began in the mid-1950s as a consequence of a political decision on the part of the United States to encourage civilian reactor development in what was then referred to as the "free world." Japanese reactor development has continued to progress in close association with developments in the United States because of the broad economic and scientific exchanges which have been promoted by the American and Japanese governments. Lately, as Japan has sought to create a basis for more independent political action, planners in government and industry have turned increasing attention to developing more extensive international relationships. American technology still figures prominently in Japan's economic development, and the United States' political presence

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[1] Eugene B. Skolnikoff, Science, Technology, and American Foreign Policy (Cambridge: M.I.T. Press, 1967), p. 9.

is still most evident in Japan. However, in atomic energy development as in other economic and political spheres, the trend is more and more to parallel but independent efforts based on the principle of equal cooperation and exchange.

Bureaucratic competition and budgetary factors also have had a significant influence on planning. Various writers have commented on the uncoordinated and uninspiring use that is made of science and technology in national policy planning. If one were to take Shils' description of science policy as the "intention to promote creativity" as a guideline, Japanese planning would not rate very high.[1] Calder also complains that there is little imaginative use of "science policy" among governments generally. He cites a recent study, which found little difference between the science policy proposals set out by the Soviet Communist Party and the American Republican Party, to support his contention that politicians do not really understand science and can speak of it only in vague, uninspiring terms.[2]

What the scientists bewail is the lack of a policy for science. What political decisionmakers are concerned with most often is science in policy. They do not find in science a new spectrum for politics, but use science and its technological applications to further political goals. Thus, it is quite natural that science and technology should become the source of bureaucratic competition and budgetary haggling. Science and technology have not brought about more orderly, "rational" decisionmaking except to the

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[1] Edward Shils, ed., Criteria for Scientific Development: Public Policy and National Goals (Cambridge: M.I.T. Press, 1968), p. viii.

[2] Nigel Calder, Technopolis: Social Control of the Uses of Science (New York: Simon and Schuster, 1969), p. 279, citing Stevan Dedijer, The New Scientist, XXI (1964), p. 461 ff.

extent that a more coordinated approach to planning is necessary to ensure that science and technology are applied in such a way as to bring about the intended political developments. However, in Japan, planning for broad policy objectives is still restricted to a relatively small political in-group. Even on the secondary level, where priorities are designated and resources allocated, the Japanese government continues to dominate the various administrative agencies and advisory boards that have been created for this purpose. It is only at a tertiary level of decisionmaking, where specific research and development objectives are decided, that authority is broadened.[1]

The following chapter will review the planning mechanism within the atomic energy development program. Planning psychology has swung dramatically on two occasions from overly optimistic forecasts in the mid-1950s to much more conservative estimates of projected growth in the late 1950s and early 1960s. Since 1967, revisions of development plans have been necessary but these were expected and have always been in an upward direction. As the Japanese have acquired more practical reactor operating experience, and have gained skill in identifying the complex patterns of social and economic growth which must accompany technological forecasts, they have become more confident in their own abilities to plan rationally for future atomic energy needs in Japan. The one area in which planning seems to have been least successful is in the area of reactor siting and environmental pollution. This question is noted here and explored more fully in Chapter VI.

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[1]The three tier science policy process concept is outlined in Long, "Science Policy in Postwar Japan," op. cit., pp. 381-82.

Japanese Atomic Energy Planning

Japanese plans in the mid-1950s for the realization of a peaceful atomic energy program were marked by bold optimism. President Eisenhower's Atoms for Peace proposal struck a responsive chord with nearly all elements of Japanese society. Japanese representatives returned from the 1955 Geneva Conference on the Peaceful Uses of Atomic Energy convinced beyond doubt that the atom was to be the industrial resource of the future, and they began immediately to proselytize their receptive colleagues in business, government, and scientific circles.[1] Their enthusiasm is evidenced in the announcement by Shoriki Matsutaro, the first JAEC Chairman, that "(W)e intend to realize atomic generation in less than five years."[2]

The Japanese were likewise determined to catch up with the West in this critical new venture. Spurred by reports of atomic energy outlooks brought back by an investigation team that visited the United States and Western Europe, the government hurriedly began laying the groundwork for an administrative structure and reactor development program. A five year projection worked out by the Economic Deliberation Council and the Institute of Industrial Science and Technology called for a heavy water-natural uranium reactor with 300 to 1,000 kilowatts of power output.[3] Plans from the Ministry of International Trade and Industry called for a ¥8 to ¥9.5 billion ($22.2 to $26.4 million) budget with four experimental reactors operative by 1959. Three of these were to be imported and one manufactured

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[1]See, for instance, accounts in Nihon Keizai, Aug. 21, 1955 in DSJP, Aug 20/21, 1955, p. 3; and Tokyo Times, Aug. 23, 1955 in DSJP, Aug. 23, 1955, pp. 1-2.

[2]Mainichi Shimbun, Apr. 23, 1956 in DSJP, Apr. 21/23, 1956, p. 18.

[3]Tokyo Times, Mar. 7, 1955 in DSJP, Mar. 7, 1955, p. 5.

domestically.[1] The bullish MITI projection also envisioned a 50,000 watt pilot plant by 1959. Commercial atomic power output by 1962 was expected to be approximately 150,000 kilowatts, increasing to 2,000,000 kilowatts by 1970 and reaching 4,000,000 by 1975.[2]

The reason for this warm reception for the peaceful atom is not difficult to understand. By 1975, for instance, MITI was projecting steel output at two and a half times the 1955 level and a 40 per cent increase in ship building. Automobile production was expected to expand eightfold.[3] Such an industrial surge would demand an enormous increase in electrical power supply which Japan's meagre domestic resources could never meet. Although a report prepared by MITI and the Atomic Energy Bureau of the STA concluded that the expected energy needs could be met with conventional hydroelectric and thermal power plants through 1975, Japan's industrial machine could be kept running only by increased coal and oil imports from abroad.[4] Besides leaving Japanese industry hostage to foreign suppliers, such large fuel imports would drain away precious foreign exchange and require sizeable expenditures on tankers and expanded harbor facilities.[5] Oil imports alone were projected to be twenty times the 1957 level by 1975.[6] An electric power industry report flatly predicted the need for 1,000,000

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[1] Nihon Keizai, Aug. 27, 1955 in DSJP, Aug. 30, 1955, p. 11.

[2] Nihon Keizai, Feb. 4, 1956 in DSJP, Feb. 4, 1956, p. 20.

[3] Nihon Keizai, Dec. 4, 1956 in DSJP, Dec. 4, 1956, p. 2.

[4] "Outlook for Long Term Demand and Supply of Electricity and Expectation for Nuclear Power," Atoms in Japan, I (June, 1957), 1-3.

[5] Atoms in Japan, I (June, 1957), 3.

[6] Atoms in Japan, I (No. 5, 1957), 17.

kilowatts of atomic power by 1965.[1]

The optimistic outlook on the development of atomic power stemmed in part from the determination of the Japanese to match Western technological accomplishments. In a sense, atomic energy acted as a release for the frustrations of the post-war period when Japan was clearly a second class nation. The Japanese were also encouraged in this competitive thinking by the United States and Great Britain which tried to outdo each other in making sales pitches for the Japanese reactor export market. One Japanese observer at the time explained that the "advertising war" between the two "produced a widespread, optimistic impression that atomic power generation is 'just around the corner.'"[2] Another factor which may account for the Japanese enthusiasm lies in the economics of reactor supply and operation. There are great advantages to be gained through economies of size, and Japanese businessmen were certainly receptive to any suggestions of ways to cut costs and raise operating efficiency.

The 1957 Plan

From the various estimates submitted by MITI, the Atomic Energy Bureau and the electric power industry, the Japan Atomic Energy Commission formulated its Eighteen-year Power Reactor Development Plan in 1957. The plan established some optimistic targets. Beginning with an initial 150,000 kilowatts of commercial power output in 1962, atomic reactors were to be providing over 7,000,000 kilowatts by 1975. By this latter date, it was predicted that most of Japan's atomic power capacity would be generated by advanced breeder reactors. Economically, atomic energy was expected to

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[1]Atoms in Japan, I (June, 1957), 1.

[2]Seiki Watanabe, "The Road to Atomic Power," Japan Quarterly, V (October-December, 1958), 421.

become competitive with coal burning power plants by 1965 and with oil burning plants by 1970.

Planning strategy The JAEC 1957 Reactor Development Plan set forth two basic strategies for atomic energy development which have been followed to the present day. First, it was decided that Japan would import foreign equipment and technology on a selective basis and, at the same time, lay the foundations for its own research and development capability. The relatively underdeveloped state of the atomic sciences in Japan, and the great initial expense involved in building a nuclear powered industrial sector, compelled the Japanese to rely heavily on foreign imports until recently. However, from the very beginning of the atomic energy program, Japan's goal has been to overcome the dependence on foreign technology and equipment.[1]

It was determined that Japan should import its first atomic power reactors. Raising technological standards of the domestic research and development program should also be a major goal, but Japanese planners felt that without immediate foreign input, atomic energy development would be greatly delayed. Specific reactors to be imported were to be determined after intensive study by Japanese teams abroad but, at any rate, the first imported reactor would be one of proven practicality.[2]

The British Calder-Hall type was selected over competitive American models since it had a relatively impressive performance record. Moreover, it used natural uranium fuel which was more readily available than the enriched uranium used in American reactors. Looking to the future, the

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[1]Nihon Keizai, Aug. 27, 1955 in DSJP, Aug. 30, 1955, p. 11; Asahi Shimbun, Sep. 7, 1956 in DSJP, Sep. 7, 1956, p. 6.

[2]Atoms in Japan, I (No. 3, 1957), 19-23.

Calder-Hall was considered more easily manufacturable in Japan than certain other more advanced, experimental reactors. At the time, the Calder-Hall unit was seen as simply a temporary expedient to fill in the slack period before a domestic fast breeder reactor (FBR) could be put into use.[1] An ambitious FBR plan, which proposed to pump over ¥1.3 trillion ($3.7 billion) by 1975 into a crash program for domestic fast breeders, was soon found to be totally impractical.[2]

The second strategic principle of the atomic energy plan set down in 1957 was that of mutual public-private cooperation and investment. In spite of opposition from the political left, as well as from certain elements within the scientific and academic communities, the government determined that the economic profit motive would be a great stimulus to atomic development. A division of labor was sketched out in which the nine private utility companies would receive imported reactors while investing their resources in the construction of electric power stations. The government, through the Japan Atomic Energy Research Institute, would concentrate on research and on developing Japan's domestic reactor capability. JAERI could then provide the research underpinnings for private industry while industry, in turn, could stimulate JAERI researchers with practical operating experience.[3]

Criticism of the plan As might be expected from an undertaking of this scope, the JAEC was not without its critics. Although there was widespread enthusiasm for the overall goal of atomic power, there was disagreement on development priorities. Also, there were conflicting concepts of the

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[1] Atoms in Japan, I (No. 5, 1957), 18-19.

[2] Ibid., p. 17.

[3] Atoms in Japan, I (No. 3, 1957), 19-23.

respective roles to be played by the public and private sectors. Developmental problems centered on research priorities and the correct balance of imported versus domestic technology. JAEC Commissioner Arisawa had earlier urged that reflection on Japan's future energy needs and energy resources be given priority.[1] MITI was especially concerned with this aspect of the development program as was the Japan Atomic Industrial Forum, spokesman for commercial and industrial firms involved in all phases of atomic energy expansion. MITI questioned the reliability of the JAEC's cost comparison projections relating coal and oil to atomic fuel, since no allowance had been made for price fluctuations over the eighteen year period.[2] JAERI chided the JAEC on its inattention to nuclear fuel cycle problems, and expressed doubt as to the practicality of the FBR program as well.[3]

The JAEC's plans for moving beyond the Calder-Hall natural uranium reactor to more advanced types were also questioned. JAERI had all along doubted the feasibility of developing the FBR within the period of the current plan, and of making it the backbone of Japan's atomic power output as the JAEC plan suggested.[4] JAIF, likewise, questioned the wisdom of attempting to move directly from the Calder-Hall to the untried, experimental FBR. Incremental progress, it was felt, through less exotic generations of reactors would not only ensure more predictable development, but would also provide time for more research on plutonium extraction, a necessary

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[1]Mainichi Shimbun, Apr. 23, 1956 in DSJP, Apr. 23, 1956, p. 18.

[2]Atoms in Japan, I (No. 6, 1957), 7.

[3]Ibid., p. 8.

[4]Atoms in Japan, I (No. 5, 1957), 17; and Atoms in Japan, I (No. 6, 1957), 8.

component of any successful FBR program.[1] The FBR program never got off the ground at this stage, and JAERI soon announced the goal of three FBRs by the 1960s had been too "bold." JAERI opted instead for a "more prudent approach."[2]

Just what this more prudent approach might be was by no means clear. JAERI supported the concept of incorporating research on enriched fuel reactors into the JAEC Eighteen-year Reactor Plan. However, as MITI pointed out, there was no coherent policy dealing with enriched fuel reactor development. JAIF, furthermore, questioned the wisdom of attempting simultaneous development of both the British-type natural uranium and the American-type enriched uranium reactors. It was doubtful that Japan had either the financial or technological resources for such an extensive effort.[3]

The electric power companies were more sanguine about the possibilities of the enriched uranium reactor program than was either the government or the nuclear industry as a whole.[4] When the JAEC's 1957 plan was later altered to incorporate a rather significant enriched uranium reactor program, there were suggestions that the change was due to political pressure by those electric utility companies which had already signed import contracts on enriched uranium reactors manufactured in the United States.[5] Many people, JAEC Commissioner Yukawa among them, resented the over-reliance on foreign technology for the sake of rapid development and saw "autonomous

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[1] Atoms in Japan, I (No. 6, 1957), 8.

[2] Atoms in Japan, II (No. 7, 1958), 16.

[3] Atoms in Japan, I (No. 6, 1957), 7-8.

[4] Atoms in Japan, I (No. 6, 1957), 8-9.

[5] Atoms in Japan, II (No. 1, 1958), 1-4.

research" as a more basic need.[1]

Controversy over the parts to be played by government and private industry also entered into the discussion of the JAEC projections. As noted above, a rough division of labor had been agreed upon, and the private utility companies were to have a major responsibility in building the atomic power network throughout Japan. However, in matters relating to the scope and funding of research, the amount and type of government guarantees to private investors, as well as the control of supporting operations like mining, refining, and processing, the symbiotic relationship was unclear.[2]

The allocation of such vast and diverse resources as a major atomic energy program entails inevitably makes such questions political in nature. Dispute quickly materialized on two major issues: the question of socialization and the question of secrecy. The government's plan, which was designed to give the lead in atomic power development to the private utility companies, reflected the thinking of the conservative politicians who approved it. It was criticized by the Socialists who felt that the entire program should rightfully be a public enterprise. At the least, they felt, the government should demand more direct regulation of private operations since sizeable financial aid was earmarked for the program in the budget.[3] The Socialists, while they backed the atomic power objective fully, were suspicious of the large scale importing of foreign reactors and of what they considered the undue haste with which the government and private utility companies were pressing the issue. The Socialists' objections to over-dependence on foreign technology were reinforced by the suspicion that

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[1]Mainichi Shimbun, Apr. 23, 1956 in DSJP, Apr. 23, 1956, p. 18.

[2]Atoms in Japan, I (No. 6, 1957), 7-9.

[3]Atoms in Japan, I (No. 2, 1957), 4-5.

visions of quick profits were partly responsible for the rush to atomic power.

The question of government secrecy was also a bone of contention, especially as it applied to the safety of atomic reactor operations. As part of its consideration of the proposed Calder-Hall reactor, the JAEC had set up a Special Committee on Reactor Safety to oversee public safety. The problem of how much and what kind of information ought to be made public on reactor operations had not been agreed upon in the Eighteen-year Reactor Plan. While the government and public utility companies stressed the necessity of safeguarding commercial secrets to protect the competitive position of Japan's incipient atomic energy industry, the political opposition and certain scientists feared that the concern over industrial security was jeopardizing the public safety. One coterie of physicists known as the Elementary Particle Theory Group was especially outspoken on the safety issue when the Calder-Hall was under discussion in 1957 and 1958.

Dissatisfaction with the JAEC's safety procedures was made public when Dr. Sakata, a member of the JAEC Special Committee on Reactor Safety, resigned his post in November, 1959 in protest over the way the Committee had handled the Calder-Hall investigation. Dr. Sakata protested that the Committee's findings had not been made public, nor had the JAEC announced its basic attitude on the issue of radiation safety. Especially at issue was the question of the maximum radiation dosage to which the public could be legally exposed in the course of reactor operations.

The resignation of Sakata presaged a continuing conflict over the question of reactor safety. In addition to his government post on the JAEC Special Committee, Sakata was Chairman of the Committee on Atomic Energy Affairs of the Japan Science Council. One of his specific complaints against JAEC safety procedures was the Commission's failure to consult with knowledgeable scientists of the JSC.[1]

The Science Council has been a frequent, if somewhat ineffectual, critic of official atomic energy policies since this time. Partly, this can be explained by the leftist political coloring of much of the JSC membership with its dislike for the close cooperation that exists between Japan and the United States in atomic energy matters and with its concern over the military potential of Japan's growing atomic energy base. Probably more basic is the frustration felt by the JSC at being increasingly on the sidelines of policymaking. Japanese physicists, chemists, and biologists frequently feel ignored while behaviorial scientists chaff under the insensitivity to social questions and "second order consequences" which they see in policymaking groups.

The 1960 Plan

The predictions of atomic power generation by the mid-1960s contained in the JAEC's 1957 plan were soon discovered to be overly optimistic. The Calder-Hall had been delayed. Cooperation among firms within the atomic industry, as well as interrelationships between the atomic industry, the government, and the economy as a whole, were unsatisfactory. Manpower needs in all scientific and technical fields were pressing. The outlook, generally so promising in the mid-1950s, had taken a decidedly pessimistic turn by 1960.[2] A series of studies on energy needs and the role of atomic power in meeting those needs were undertaken by the government and private industry.

The Energy Subcommittee of the Economic Deliberation Council published

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[1] Atoms in Japan, III (October-November, 1959), 1-9.

[2] Atoms in Japan, V (January, 1961), 1-3.

a report on energy needs in September, 1960. The study forecast an increase in total energy demand in Japan by 1970 of well over twice the 1959 level, an average increase of 7.8 per cent annually. Demand for electricity in particular was expected to rise much more steeply than the average. In 1959 electricity accounted for 38 per cent of the total energy consumed in Japan; by 1970 electricity consumption would rise to 47 per cent of the total. The Economic Deliberation Council predicted the need for 1,000,000 kilowatts by 1970, rising to 9,500,000 kilowatts by 1980.[1] This estimate was higher than predictions by MITI, the JAEC and the JAIF. While these latter organizations accepted a 1,000,000 figure for 1970, their estimates for 1980 ranged between 6,000,000 and 8,500,000 kilowatts.[2]

The JAEC revised atomic energy plan of 1960 was a more scaled down image of the 1957 version. Throughout the mid-1960s the emphasis was to be placed on developing a sound technological base for later expansion, and on training necessary scientists and technicians. Emphasis was to be on the economics of atomic power and on long range domestic research and development. The rather uncritical fascination with atomic power generation characteristic of the 1957 forecasts was played down in favor of more hard-nosed cost effectiveness thinking. Atomic power would be measured by the same standard of economic competition as were other energy sources. Atomic fuel was not expected to become competitive with fossil fuels now until the 1970s.

Japanese research and development were to be pushed under this revised plan. While constituting no change in direction from the earlier plan, the 1960 priorities did reflect an increasing awareness of the need for a sound domestic capability. Training programs were to be expanded, both natural

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[1] Nihon Keizai, Sep. 29, 1960 in DSJP, Sep. 29, 1960, p. 17.

[2] Atoms in Japan, IV (August, 1960), 1-6.

and enriched uranium type reactors would be developed, and the centrifuge enrichment technique would be given higher priority.[1]

Although undeniably a deceleration, the change in pace was made more palatable by a rethinking of overall political and economic parameters within which this new technology was to serve the Japanese state. The 1957 plan had been drawn up at a time when Middle Eastern politics were threatening the supply of oil so desperately needed by Japanese industry. Japan's domestic economy was weak and its future uncertain, while its balance of payments situation was a source of concern. The seeming lack of any viable alternatives perhaps made a leapfroging atomic energy plan appear imperative. By 1960 the oil crisis had eased and economic forecasts had improved. Prime Minister Ikeda was speaking optimistically of doubling Japanese GNP within ten years. Japan was feeling more capable of holding its own in international economic competition and was coming around to the realization that its real future lay in long range development of alternative energy sources with a solid technological base at home.[2]

The emphasis on long range energy planning, and the recognized need for continuing consultation between government and the energy industries, resulted in the formation of the Industrial Structure Deliberation Council within MITI in May, 1962. JAEC Commissioner Arisawa was appointed chairman of the Council. It was to serve as the "supreme deliberative organ" on energy policy,[3] and its dual objectives were to provide for low cost fuel and, at the same time, stabilize fuel supplies. The Council had actually

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[1] Atoms in Japan, IV (August, 1960), 1-6; and Atoms in Japan, V (February, 1961), 1-5.

[2] Atoms in Japan, V (February, 1961), 2-3.

[3] Nihon Keizai, Apr. 13, 1962 in DSJP, Apr. 19, 1962, p. 7.

originated in April, 1960 as an ad hoc research organ during preparation of the revised energy plan. Now it was reactivated and given the task of ensuring that the input of 1,000,000 kilowatts of atomic power into Japan's industrial complex by 1970 would be accomplished smoothly.[1]

In its report in December, 1963 the Economic Deliberation Council stated its specific objectives for the energy industries. There was no fear that atomic power would put the traditional fossil fuel sector out of business. Over the past decade demand for energy in Japan had grown at an average annual rate of 9.6 per cent. By 1970 fuel demands were expected to be well over twice the 1962 level.[2] The atomic power industry could not possibly meet such a huge increase in electricity consumption. Rather, it was to be a question of allocating various energy resources in the proper amounts to the appropriate industrial sectors, and thereby achieve economical use of power output while providing a continuing supply of resources for the future.

Fossil fuels could continue to be in demand for the foreseeable future. However, since Japanese coal reserves were meagre and domestic oil non-existent, Japan needed to look to foreign suppliers for these fuels. Atomic fuel held out the promise of freeing Japan from this dependency. Therefore, a major goal of the Industrial Structure Deliberation Council would be to promote a domestic atomic energy capability through a combination of liberal public and private investment, importation of the most advanced

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[1] Atoms in Japan, VII (July, 1963), 15-16.

[2] Atoms in Japan, VIII (January, 1964), 8-11.

foreign technology, and infant industry protection.[1]

The 1967 Plan

If the 1957 Reactor Development Plan had been overly optimistic on the prospects for atomic power, the 1960 plan erred on the conservative side. Research and development both in Japan and abroad had helped to dissipate the general disillusionment that overtook atomic power advocates in the late 1950s and early 1960s, and it was recognized by 1966 that new projections were required.

A great psychological boost was given to the Japanese utility companies when an American firm, Jersey Central, decided in 1963 to go ahead with plans for a 640,000 kilowatt atomic power plant at Oyster Creek, New Jersey. The fact that this project was to be financed wholly by private capital encouraged the Japanese, who had originally opted for a large private share in their own program.[2] Moreover, Japan's first 12,000 kilowatt demonstration power reactor had gone critical in 1963, and the Calder-Hall began producing 160,000 kilowatts of commercial power at the Tokai-mura complex in 1966. Although two years late and plagued with minor operating difficulties, this reactor had made commercial atomic power a reality in Japan. Progress had been made in the ATR-FBR program and in plutonium production. Private operators were also buoyed by the government's authorization for private

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[1]Atoms in Japan, VIII (January, 1964), 8-11. An example of the special encouragement given the atomic energy industry is the extra 25 per cent equipment depreciation allowance it was granted and the reduction by half of the industry's fixed assets tax for the first three years of operation. See Atoms in Japan, XII (October, 1968), 28-29.

[2]Victor Gilinsky and Paul F. Langer, The Japanese Civilian Nuclear Program (Santa Monica: The Rand Corporation, 1967), pp. 3-4.

ownership of nuclear materials.[1] In September, 1966 a 137-man committee under Kaneshige Kankuro began to revise the 1960 Long Range Plan.[2]

The 1967 plan sharply increased the goals for atomic power production over the 1960 plan levels. The new prediction called for 6,000,000 kilowatts output by 1975. Compared to the 6,000,000 to 8,500,000 kilowatts by 1980 called for in the 1960 plan, the 1967 version called for 15,000,000 to 20,000,000 kilowatts. From there it rose steeply to between 30,000,000 and 40,000,000 kilowatts of electrical output in 1985. Larger individual reactors were also programmed. Prototypes of a 200,000 kilowatt thermal reactor and a 200,000 to 300,000 kilowatt fast breeder were scheduled for completion in 1973 and 1976 respectively. A 500,000 kilowatt commercial reactor was being planned to begin construction about 1970. Government financial support, a weakness of the previous plans, was to increase sharply. Over ¥432 billion ($1.2 billion) was to be allocated up to 1976 in the national budget for atomic power reactor development.[3] The 1967 goals would have seen Japan on a par with France and West Germany by 1985.[4]

For the long range prospect, into the 1980s and beyond, the 1967 plan looked to fast breeder reactors and to a fuel enrichment capability to free

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[1] In October, 1966 the Cabinet approved private ownership of "special nuclear materials" (plutonium, enriched uranium, and Uranium-233) as of November, 1968. "Nuclear source materials" (natural uranium, depleted uranium, and thorium) had been authorized for private ownership since 1961. The 1966 decision was made after the United States had relaxed its ownership regulations similarly. Japanese firms could now take part directly in international transactions involving transfer of these materials. See Atoms in Japan, X (October, 1966), 2-4; and Atoms in Japan, XII (July, 1968), 28.

[2] Atoms in Japan, X (October, 1966), 5.

[3] Atoms in Japan, X (October, 1966), 5-6; Nihon Keizai, Mar. 23, 1967 in DSJP, Mar. 25, 1967, pp. 4-5; and Hiroshi Murata, "Nuclear Energy: The Next 10 Years," New Scientist (Japanese Supplement), XXXVI (November 16, 1967), 3-4.

[4] Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., p. 17.

Japan of its dependency on foreign suppliers. The fast breeder was expected to be commercially feasible by 1985 and, in the meantime, research and development was to continue on the natural uranium-heavy water advanced thermal reactor. The latter is expected to be operative in the 1975-1984 period, and will serve to keep Japan abreast of atomic energy technology while the FBR is still in the experimental stage. The ATR's spent fuel, as well as that from present generation natural uranium reactors, will serve as a source of plutonium for the post-1984 FBRs.[1]

Expanding Energy Needs: A Broader Perspective

A word might be said at this point about Japan's oil supply situation because it helps to explain the reason why Japanese energy planners have promoted such rapid atomic energy development and why, as will be detailed in the succeeding chapter, there is so much concern over establishing fuel supply cycles under Japanese control. Japan has been described as "the country most susceptible to economic distress in the event of a major upset in the international oil industry,"[2] and the pinch has begun to be felt lately as Japan has found itself caught in the middle of the supply war being fought out between the major oil producing countries and the primary refining companies.

In 1950, as Japanese industrial production began to take an upward turn from its post-war slump, the need for crude oil became crucial. With the encouragement of the United States Occupation authorities, American oil companies were given long term oil supply contracts in return for a 50 per

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[1] Nihon Keizai, Mar 23, 1967 in DSJP, Mar. 25, 1967, p. 5; and Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., p. 39.

[2] Peter R. O'Dell, Oil and World Power (New York: Taplinger Publishing Co., 1971), p. 117.

cent capital investment in Japanese refinery operations.[1] By 1968, five American oil companies had come to control nearly 80 per cent of Japan's oil imports. Moreover, many Japanese refineries were merely subsidiaries of foreign oil companies.[2] Thus, Japan has found itself in an uncomfortably vulnerable position when it comes to regulating either the flow of crude oil into Japan or the prices charged for it.

The Japanese government has been working for some time to correct this situation. As part of the general energy policy review that was undertaken in 1962-1963, a decision was reached to seek to expand the degree of Japanese influence over the oil supplies so vital to industrial growth. Through close cooperative arrangements between government and industry, a broad program was drawn up to enhance price stability, expand refinery construction, reserve local markets for Japanese-produced oil, and provide special aid allowances and tax credits for oil and gas exploration by domestic companies. In 1967 the Petroleum Development Public Corporation was set up to coordinate oil exploration in Canada, Alaska, Indonesia, Australia, and Latin America.[3] The private energy companies have organized themselves into six giant oil combines,[4] similar to the atomic energy consortia, to carry out the domestic oil development program.

However, even though the Japanese government now exercizes supervision and control "at all significant points over the activities and decisions of

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[1]O'Dell, Oil and World Power, op. cit., pp. 119-20.

[2]The situation is similar for other vital industrial raw materials like copper, nickel, and aluminum. See Shuichi Miyoshi, "Japan's Resources Policy At A Turning Point," Japan Quarterly, XVIII (July-September, 1971), 285-86.

[3]O'Dell, Oil and World Power, op. cit., pp. 124-28.

[4]Mitsubishi, Mitsui, Sumitomo, Daiichi, Sanwa and Fuyo

the international companies selling oil to or in Japan,"[1] the Japanese oil supply is still vulnerable on three counts. First, it is highly sensitive to the increasingly volatile politics of the Middle East. With 80 per cent of its imported oil coming from this part of the world, rising Arab nationalism and the increasing tendency of Arab governments to use their oil reserves as a form of political and economic leverage is particularly disturbing to Japan. Already in 1973, Japanese refineries faced the prospect of having to reduce operations because of the combined effect of production restrictions instituted by Kuwait and Iraq, holdups in construction of facilities in Saudi Arabia, and expanded purchases of Middle Eastern oil by European countries. Japanese oil stockpiles are sufficient to sustain normal refining operations for only a few weeks should the import flow be reduced.[2]

Second, international oil companies have sought to recoup from their consumers the economic losses they have suffered in their dealings with OPEC.[3] For Japan, which in 1972 consumed 250,000,000 kiloliters of oil (approximately 10 per cent of the total world output) and accounted for 20 per cent of the world oil trade,[4] the uncertainty of supply coupled with steadily rising import costs has become acute. Third, Japan is vulnerable from the standpoint of transportation. It has been estimated that by the 1980s, with an oil import pattern similar to the one that now exists, Japan will require a steady stream of oil tankers strung out at forty kilometer intervals from Japan to the Persian Gulf.[5] With the uncertain strategic

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[1] O'Dell, Oil and World Power, op. cit., p. 18.

[2] Sankei Shimbun, Jan. 27, 1973 in DSJP, Feb. 1, 1973, p. 8.

[3] Organization of Petroleum Exporting Companies

[4] Sankei Shimbun, Dec. 28, 1972 in DSJP, Jan. 11, 1973, p. 1.

[5] Miyoshi, "Japan's Resources Policy," op. cit., p. 284.

situation in the Indian Ocean, the increasing international concern over ocean pollution from oil spills, and the need to assure transit through the Indonesian archipelago, the transportation problem injects another unpredictable variable into the oil import equation.

The strategic consequences of oil and Japan's long term energy supply are under study now by MITI, the Foreign Ministry and the Economic Deliberation Council. To meet immediate needs, import contracts have been signed with the People's Republic of China for 200,000 tons of oil.[1] An agreement is being worked out with the Republic of Korea for joint oil exploration in the East China Sea, and the South Korean, Japanese, and Taiwan governments have set up a Joint Ocean Development Research Committee to explore multilateral approaches for developing natural resources in this area.[2] There have been talks under way for some time between Japan and the Soviet Union on tapping Siberian oil fields in return for Japanese investment capital in that area. The possibility of an oil pipeline linking Vladivostock and Niigata has been discussed as well. Exploration for natural gas deposits are also being undertaken by Japanese companies in the waters off western Kyushu and the southern end of Honshu.[3] However, the area most looked to at present for a nearby source of oil which would be under direct Japanese control is the waters around the Senkaku Islands. Both Japan and the Chinese in Taipei and Peking claim sovereignty over the Senkakus (Tiao Yu Tai), although China's case has been presented most forcefully thus far by the government on Taiwan. As Whiting has pointed out, Peking, too, claims the Senkakus as Chinese territory, and its support of Latin American

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[1]Sankei Shimbun, Jan. 13, 1973 in DSJP, Jan. 17, 1973, p. 27.

[2]Yomiuri Shimbun, Jan. 23, 1973 in DSJP, Jan. 30, 1973, p. 24.

[3]O'Dell, Oil and World Power, op. cit., p. 129.

claims over the continental shelf two hundred miles out could indicate it may intend to exert stronger claims over the islands at a later date.[1]

The need for energy fuels will continue to increase in Japan. The Japanese economy is expected to grow at approximately 10 per cent annually throughout the 1970s, and its demand for oil, which expanded 17.6 per cent annually from 1964 to 1968, can be expected to increase as its annual consumption reaches 500,000,000 kiloliters in 1980 and 700,000,000 kiloliters in 1985.[2] In "the world's largest and most rapidly growing single national market for imported oil . . ."[3] Japanese energy needs are going to press harder and harder on political decisionmakers. It is from this perspective that planning projections for atomic energy development in the years ahead have been made.

Post-1967 Plans

Since 1967 atomic energy planners in Japan have continued to raise and broaden their sights. The debate on details of reactor development continue, but the general outlines of the 1967 forecast still hold. However, larger and more efficient power plants have been added to the growing inventory of atomic energy facilities. Plants with a 1,000,000 kilowatt capacity are begin planned for 1975 with 1,500,000 kilowatt plants planned for 1982.[4] A JAEC forecast released in 1972 has raised the anticipated electrical output of atomic power plants in 1985 from the 30,000,000 to 40,000,000 kilowatt

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[1]Allen S. Whiting, "New Perspectives in Asia," Pacific Community, III (January, 1972), 271.

[2]Miyoshi, "Japan's Resources Policy," op. cit., p. 284.

[3]O'Dell, Oil and World Power, op. cit., p. 88.

[4]Overall Energy Research Deliberation Council, Interim Report in Selected Summaries of Japanese Magazines (hereafter cited as SSJM), June, 1971, p. 63.

range of the 1967 plan to 60,000,000 kilowatts; i. e., one quarter of the total electrical output.[1] According to a press release at the 1971 Atoms for Peace Conference in Geneva, by 1990 atomic plants will be providing 40 per cent of Japan's electric power and by 2000 fully one half.[2] The cost of the power plant and fuel projections up to 1984 are now at the ¥7 trillion ($19.4 billion) level.[3] The present reactor development schedule up to 1980 is shown below in Table No. 1.

Future goals are, of course, subject to certain limitations. Money is a major factor. The ATR-FBR program has been allocated in the neighborhood of ¥200 billion ($550 million) over the next ten to fifteen years. Some 80 per cent of this will come from public funds. Even so, some analysts feel this is not sufficient for such a vast research and development program, much of which is still in the experimental stage. Rather than attempt both the ATR and FBR, it has been suggested that the ATR be dropped since it is not a great technological improvement on present reactors, and because it is considered only a temporary measure, anyway.[4]

There are no signs that the ATR will be dropped.[5] Rather, adjustment will be sought through more money for the atomic energy program. Since the mid-1960s the national budget allotment for atomic energy research and development has risen dramatically. The STA sought for years to break

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[1] Japan Times Weekly, June 10, 1972, p. 9.

[2] Thomas O'Toole, "Japan, Switzerland Push for Atomic Power," Washington Post, Sep. 19, 1971, p. A26.

[3] Overall Energy Research Deliberation Council, Interim Report, op. cit., p. 64.

[4] Victor Gilinsky and Milton Plesset, "Comments on the Japanese Nuclear Program," Atoms in Japan, XII (May, 1968), 6-7.

[5] The ATR-FBR program is explored in Chapter IV, "Technological Imperatives: The Nuclear Fuel Cycle and Reactor Development."

TABLE 1

NUCLEAR REACTOR DEVELOPMENT PLANS OF JAPANESE UTILITIES COMPANIES
1971-1980

Company	No. of Plants	Total KW	KW Range per Reactor
Tokyo	24	28,496,000	460,000-1,500,000
Kansai	20	22,768,000	340,000-1,500,000
Chubu	8	9,190,000	540,000-1,500,000
Kyushu	5	3,596,000	559,000- 826,000
Chugoku	4	2,960,000	460,000-1,000,000
Hokuriku	3	2,100,000	500,000- 800,000
Tohoku	3	2,092,000	524,000- 784,000
Shikoku	3	1,932,000	566,000- 800,000
JAPCO	3	1,623,000	166,000-1,100,000
Hokkaido	1	350,000	350,000
PNC	1	165,000	165,000
Total	75	75,272,000	. .

Source: Atoms in Japan, XVI (Debember, 1972), 44-46.

through the fiscal barrier imposed by the Ministry of Finance, which limits each ministry or major agency to annual budgetary increases totaling no more than 25 per cent over the previous year. So far the MOF guidelines have held firm. They are sure to come under more pressure in the years ahead, however, as Japan presses ahead with the ATR-FBR and centrifugal uranium enrichment projects.

Manpower is another factor to be considered. An expanded training program for scientists and engineers was recognized as critical by 1967. Scientists and engineers have been in short supply, and as Japanese science and technology comes to demand more and more manpower in the years ahead, the shortage could grow much worse if steps are not taken soon to correct the deficiency.[1] The major training programs set up for atomic scientists, engineers, and support personnel is shown below in Table No. 2.

One reason for this shortage of personnel, endemic to Japanese science generally, is the lack of money. In the 1958-1963 period, for instance, Japanese investment in scientific research and development was outdistanced by West Germany two to one, by France three to one, by the Soviet Union by more than six to one, and by the United States at better than twenty-three to one. Part of the reason for this is that, in Japan, the government has been traditionally penny-pinching with its research funds while private investments have been committed cautiously and with an eye to short run profit expectations.[2] Even by 1969 the government research and development budget for universities was only about $320 million. This comprised roughly

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[1]Nihon Keizai, Mar. 23, 1967 in DSJP, Mar. 25, 1967, p. 7; and Dec. 10, 1969 in DSJP, Dec. 17, 1969, p. 18.

[2]Embassy of Japan, Japan Report, XI (December 15, 1965), 4.

TABLE 2

SPECIAL ATOMIC ENERGY TRAINING AND EDUCATION
COURSES IN JAPAN
(as of March, 1970)

Institution and Course	Government Programs: Student Capacity	Length of Course	Trainee Educational Level
JAERI Nuclear Engineering School			
Senior	40	6 mos.	College graduate
Special	8	1 yr.	" "
Operation Training	21	7 mos.	High school
Health Physics	20	6 mos.	(None listed)
JAERI Radioisotope School			
Basic	32	1 mo.	College graduate
Advanced	15	2 mos.	" "
Special	15	1-2 wks.	(None listed)
Radiation Protection	30	7 wks.	Jr. college graduate
National Institute of Radiological Science			
Medical Application	16	6 wks.	Doctor or dentist
Radiation Pharmacy	20	5 wks.	College graduate
Radioisotope	10	6 wks.	" "
Japan Atomic Power Company			
Operator Training	15	11 mos.	High school
Basic	39	3-5 mos.	(None listed)
Ibaraki Vocational Training Center			
Atomic Energy	30	2 yrs.	High school

University Programs

Institution	Course	Student Capacity	Year Est.
University of Tokai	Nuclear Engineering	60	1956
University of Kyoto	" "	20	1958
University of Tokyo	" "	36	1960
University of Kinki	Reactor Engineering	40	1961
University of Tohoku	Nuclear Engineering	40	1962
University of Osaka	" "	40	1962
University of Nagoya	" "	40	1966
University of Kyushu	" "	40	1967
University of Hokkaido	" "	40	1967

Source: Japan Atomic Energy Commission, Fourteenth Annual Report: 1969-1970 (Tokyo: Japan Atomic Energy Commission, n.d.), pp. 109-111.

half of the total government research budget that year.[1]

Another problem has been compartmentalization. Government, industry and university research programs in all scientific fields have moved on similar but separate tracks. Unlike the United States, in Japan there is little contract work involving cross-fertilization of ideas among these three systems. In 1963 only about 1 per cent of university research funds came from industry while less than half of 1 per cent of industry research expenditures came from the government. Professors at national universities are forbidden by law from accepting industry research contracts. In general, the universities have stuck to basic or theoretical research, the government to applied research, and industry to developmental research.[2]

These problems have been under attack for some time. On a national level, the government established the Research Development Corporation in 1960 to facilitate contracts among government, industry and the universities by supervising bids for research projects and then coordinating and evaluating their work. The Japan Science Foundation, also subsidized by the government, has tried to bring about more exchange of scientific and technical information between the academic world and industry. The Foundation also operates a science museum, an educational television station and science centers.[3] The science centers are run under prefectural and local government supervision. Their main purpose is to provide short training courses for primary and secondary science teachers, thereby

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[1]Philip M. Boffey, "Japan (II): University Turmoil Is Reflected in Research," Science, CDXVII (January 9, 1970), 148.

[2]Theodore D. Long, "Science Policy in Japan," OECD Observer, June, 1967, p. 32; and Philip M. Boffey, "Japan (III): Industrial Research Struggles to Close the 'Gap'," Science, CDXVII (January 16, 1970), 267.

[3]Long, "Science Policy in Postwar Japan," op. cit., pp. 288-93.

TABLE 3

JAPANESE GOVERNMENT BUDGET FOR ATOMIC ENERGY, 1955-1973
TOTALS and as PERCENTAGE OF TOTAL GOVERNMENT BUDGET
and GROSS NATIONAL PRODUCT
(Millions of Yen)

Fiscal year	A Atomic Energy Budget	B Total Government Budget	A/B	C Gross National Product	A/C
1955	368	1,013,314	.03%	8,864,600	.004%
1956	3,600	1,089,652	.33	9,950,900	.04
1957	6,000	1,184,614	.51	11,248,900	.05
1958	7,800	1,333,083	.59	11,785,000	.07
1959	7,400	1,512,000	.49	13,608,900	.05
1960	7,700	1,743,100	.44	16,207,000	.05
1961	7,700	2,063,500	.37	19,852,800	.04
1962	8,000	2,556,600	.31	21,659,500	.04
1963	9,500	3,044,300	.31	25,592,100	.04
1964	10,800	3,311,000	.31	29,646,700	.04
1965	11,900	3,723,000	.32	32,838,000	.04
1966	12,800	4,459,200	.29	38,399,500	.03
1967	15,000	5,113,000	.29	45,294,300	.03
1968	20,600	5,937,100	.35	53,380,600	.04
1969	29,900	6,917,800	.43	62,920,400	.05
1970	39,000	8,187,700	.48	73,213,700	.05
1971	50,400	9,414,300	.52	81,093,200	.06
1972	56,100	11,467,700	.49	94,300,000 (est.)	.06
1973	62,600 (est.)	14,284,073 (est.)	.44	109,800,000 (est.)	.06

Sources: *Atoms in Japan*, 1956-1972
Japan Times Weekly, Feb. 3, 1973, p. 8
Japan Statistical Yearbook, 1970, 1971
Ministry of Foreign Affairs, *Information Bulletin*, Vol. XX (January 15, 1973).

stimulating interest in scientific and technical careers among Japanese youth.[1]

Efforts to bring about more integration between government and academic experts has succeeded to some extent. Dimock reports that the linkage between the two worlds is closer in scientific and technical fields than in other academic disciplines. For instance, 30 per cent of those enrolled in government-run management training programs in 1965 were academics, while 47 out of 148 instructors were also from the universities. In 1967, out of 7,600 individuals serving on various government technical committees, 1,800 were professors.[2]

In order to achieve better coordination of the many interrelated facets of atomic energy research and development projects in being, and to infuse a more rational basis for allocation of research funds, the 1967 Long Range Plan divided atomic energy research into "Special Integrated Atomic Energy Research" and "Special Atomic Energy Research and Development." The latter projects are also referred to as "National Projects." Special Integrated Research Projects (food irradiation, nuclear fusion, and uranium enrichment) can be considered somewhat peripheral to the immediate task of power reactor development. Also, they consume smaller amounts of money than do so-called National Projects, and they are more compact administratively although not necessarily less significant in their implications. By contrast, Special Research and Development Projects, or National Projects, are concerned with the immediate goal of economical electric power output by means of atomic energy. Three national projects had been designated as of 1970: the FBR,

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[1]Bentley Glass, "The Japanese Science Education Centers," <u>Science</u>, CDIV (October 14, 1966), 221-28.

[2]Dimock, <u>The Japanese Technocracy</u>, <u>op</u>. <u>cit</u>., pp. 123-24.

the ATR, and the nuclear-powered ship "Mutsu."[1]

A final factor which could have a limiting effect on atomic power development in Japan is that of safety and public health. Recently the issue of public confidence in atomic energy has come to the fore and may well prove to be the most serious domestic challenge to atomic energy development in the years ahead.[2] The problem of selling the idea of atomic energy to the public is now being faced for the first time. As STA Director Nishida remarked to the Cabinet when he presented the JAEC White Paper in July, 1970, "Japan has entered the era of practical application."[3] With this technological triumph comes the responsibility of ensuring that technology is applied in a manner consistent with the public interest.

The Japanese public, already acutely sensitized to the issue of atomic radiation, has witnessed the public outcry elsewhere against insufficient safety precautions, principally in the United States. Since Japan's own atomic energy program has relied so heavily on American know-how and design, the debate over the adequacy of safety measures in the United States is bound to exacerbate Japanese misgivings. Atomic power plant siting, therefore, has recently become an emotional and highly politicized issue in Japan. During the period when atomic power was still in the theoretical stage or isolated from the public consciousness in Tokai-mura, little attention was given to the issue by Japanese planners. Now, however, public pressure has already forced the alteration of some plant sitings and threatens to disrupt development plans even further.

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[1]JAEC, Fourteenth Annual Report, op. cit., pp. 109-11.

[2]This issue will be explored in Chapter VI, "The Japanese Public as a Political Actor."

[3]Atoms in Japan, XIV (August, 1970), 20.

A recent atomic energy survey report lists siting as one of the five major problems facing the industry today.[1] The JAEC's 1972 revised planning estimates likewise stress the importance of control over radioactive emissions and of proper waste disposal measures.[2] The private utility companies are urged to carry on active public relations programs to educate and, it is expected, convince the Japanese public that atomic power is safe.

Atoms in Japan, the industry trade journal, brought home the public safety issue to those who are committed to atomic power in a most forceful manner recently. In an editorial entitled "Responsibility for Environmental Problems" the journal cited the recent experience of the Chisso Chemical Company. Mercury wastes from a Chisso plant in southern Japan were determined to have been the cause of the Minamata disease, a particularly painful form of paralysis which usually results in death. The editorial cited Chisso as a former "elite" company which, nevertheless, is now facing bankruptcy because of extended legal suits, medical claims, and the adverse publicity steming from the Minamata disaster. So as to leave no doubt, the editor closed by stating: "(T)his case presents an invaluable lesson to private industry on the need to protect the environment and human life.[3] Japanese atomic energy planners now admit that

> it is becoming difficult to unify the views of local residents on the construction of atomic power generation plants. These factors, which will restrict the construction of such plants, are expected to come further to the fore in the future.[4]

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[1]Overall Energy Research Deliberation Council, Interim Report, op. cit., pp. 58-77, passim.

[2]Japan Times Weekly, June 10, 1972, p. 9.

[3]Atoms in Japan, XVI (March, 1972), 35-37.

[4]Overall Energy Research Deliberation Council, Interim Report, op. cit., pp. 65-66.

Planning and Rational Decisionmaking

The concept of mixed-scanning, with its emphasis on the continuous interplay between the comprehensive and incremental aspects of decision-making, seems particularly applicable to the Japanese atomic energy experience. Following the Atoms for Peace announcement a coordinated review of Japan's energy needs was undertaken by the STA, MITI, the Economic Planning Agency, and the electric power industry. These studies all reflected fundamental agreement on the long range prospects for atomic energy. Japan would soon be facing an energy crisis, and opinion was unanimous that Japan should seize the opportunity to exploit the industrial uses of the atom. Working from this foundation, the JAEC formulated its long range plan in 1957 along two tracks. First, technical demands would be met through the importation of foreign technology and the simultaneous development of domestic research and development capabilities. Second, political and economic organization would proceed on the basis of joint private-public partnership.

While there was agreement on fundamental objectives, differences of opinion existed from the start on development priorities and resource allocations. Specifically, these differences centered on the degree to which Japan should rely on foreign technology, on the correct balance between basic scientific research and commercial reactor development, and on the extent and nature of the state's involvement in industrial technology.

This experience with planning in Japan reveals the dynamic interrelationship operating continually between the fundamental and incremental processes of decisionmaking. The fundamental goals set out in the 1957 Eighteen-year Plan, for example, were very quickly revealed to have been based on inaccurate perception of short term development. Likewise, the 1960 long range plan was revised in 1967 to reflect unanticipated short run developments that occured during this period. The Japanese have been, on the whole, quite alert to the need for constant reassessment of long range priorities and allocations of resources. While the overall political objective of a self-sustaining domestic atomic energy capability has remained constant, the interplay between long range and short run estimates of needs has retained a high degree of flexibility. To the extent that long range estimates of energy needs are adjusted to coincide with incremental decisionmaking realities, the Japanese approach to planning in this case can be said to be a rational and highly successful one.

In one respect the rational basis of Japanese decisionmaking can be questioned. If one accepts the incrementalist thesis that rational planning proceeds on the basis of decisions adjusted through the widest possible articulation of "partisan" interests, then the rational basis of the Japanese decisional process is to some extent lacking. As noted previously, participation in Japanese political decisionmaking is restricted to a rather limited number of actors. The government dominates the decisionmaking apparatus, and the scope of non-governmental input is closely regulated. To the extent that the Japanese decisionmaking model does not facilitate easy access to the decisional unit of interests articulated by the scientific community and other groups from the public at large, its usefulness as a guide for technology planning and assessment in other environments is limited. The influence which the Japanese public and Japanese scientists have had on political decisionmaking will be explored in Chapters VI and VII. It should be noted here, however, that conservative Japanese governments have not been especially receptive to the idea of opening the policy deliberation process to wide-ranging debate over fundamental political goals and priorities. Strong expressions of discontent and dissatisfaction with incumbent policy have often been characterized as irresponsible and, as in the case of the Japan Science Council, have prompted the government to establish further bureaucratic barriers between itself and its critics. To the extent that this alienates politically minded groups and creates doubt that interests can be effectively articulated through the existing political system, such attitudes are socially dysfunctional and lead to a less efficient and rational system for policy planning.

CHAPTER IV

TECHNOLOGICAL IMPERATIVES: THE NUCLEAR FUEL CYCLE AND REACTOR DEVELOPMENT

Technology Exchange and Political Penetration

Fuel is the most basic factor determining the generation of energy. Without an available fuel supply, even the most advanced technological systems are worthless in meeting the practical needs of society. The nuclear fuel cycle, the term applied to the complete atomic energy production-consumption cycle, is, therefore, of paramount concern when planning for the generation of electricity from atomic energy. The next two chapters will describe in general terms the operation of the nuclear fuel cycle in Japan. They will attempt to show the way in which the imperatives of the fuel cycle can lead to the articulation of political demands and how, in turn, the effects of fundamental political decisions are manifested in the configuration of the nuclear fuel cycle.

In recent times industrial technology has always been a subject with major political consequences for Japan. Because the demand of the Japanese industrial sector for raw materials and technological expertise has always exceeded the supply that Japanese society at large could provide, Japan has been forced to depend on resources located outside Japan to maintain a level of economic activity sufficient to sustain an increasingly complex and technologically oriented social system. This has been especially true in the case of atomic energy technology and raw materials.

The international linkages which have been so important in assisting

Japan toward the technological goals of its atomic energy program have had some political implications which have not always been as welcome. Rosenau has identified three types of international linkages which he labels penetrative, responsive and emulative.[1] To the extent that the linkages between Japan and other international actors have been responsive or emulative, they have been relatively uncontroversial. The Japanese have actively sought to adapt organizational principles and technology assessment methods developed elsewhere to the domestic scene. The United States, in particular, has been taken as the model for much of the Japanese atomic energy regulatory and promotional institutional set-up. However, penetrative linkages have been formed only with reluctance and out of need for technology inputs that could not be obtained by alternative methods.

Rosenau defines a penetrative political process as one in which "the members of one polity serve as participants in the policy processes of another," one in which they "share with those in the penetrated polity the authority to allocate its values."[2] In the linkages between Japan and the United States and Great Britain, there have been two obvious areas where political penetration has occured. These are explored in Chapter V. On the issue of secrecy, American prohibitions on the release of certain sensitive data conflicted directly with the political principle of free dissemination of information which had been adopted by the Japanese scientific community. This secrecy issue was debated not only in the

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[1]The concept of linkage is explored at length in James N. Rosenau, "Pre-Theories and Theories of Foreign Policy," in Approaches to Comparative and International Politics, ed. by R. Barry Farrell (Evanston: Northwestern University Press, 1966), pp. 65-71; and James N. Rosenau, "Toward the Study of National-International Linkages," in Linkage Politics, ed. by James N. Rosenau (New York: The Free Press, 1969), pp. 46-47, 56-58.

[2]Rosenau, "Toward the Study of National-International Linkages," op. cit., p. 46.

context of Japan's national security and foreign policy, but also in terms of reactor safety which many Japanese scientists complained could not be verified without fuller access to atomic data. Great Britain became an actor, however reluctantly, in a domestic Japanese political debate, through a technical clause in its atomic energy agreement with Japan which limited British fuel suppliers' liability in the event of a reactor accident. This gave rise to an intensive debate over the issue of public versus private responsibility for industrialization and government indemnification of business. Such issues went to the heart of the ideological differences between Japanese political parties. The public safety issue was also involved here, and will be explained more fully in Chapter VI.

Such issues can be said to have contributed directly to Japanese determination to overcome their technological dependency on foreign countries, and to their search for ties with a variety of countries. While Japan has always welcomed international technology exchanges, her leaders have also been alert to the political consequences which can ensue from them. In recent years, the emphasis has been on "mutualism" and on avoiding the kind of political penetration which accompanied earlier technology import agreements. The question of political penetration has occured again in the form of international efforts to control nuclear proliferation. This aspect, too, will be explored at length in later chapters.

Chapters IV and V will demonstrate the difficulty of separating the various aspects of atomic energy development as either technical or political considerations, or as factors with strictly national or international impact. For the sake of analysis, such distinctions may at times be useful, but it should be kept in mind that as such they are always artificial, and can lead to significant differences in the way actors perceive problems which arise and the way they seek meaningful solutions to those problems.

Nuclear Fuel Cycle and Reactor Development

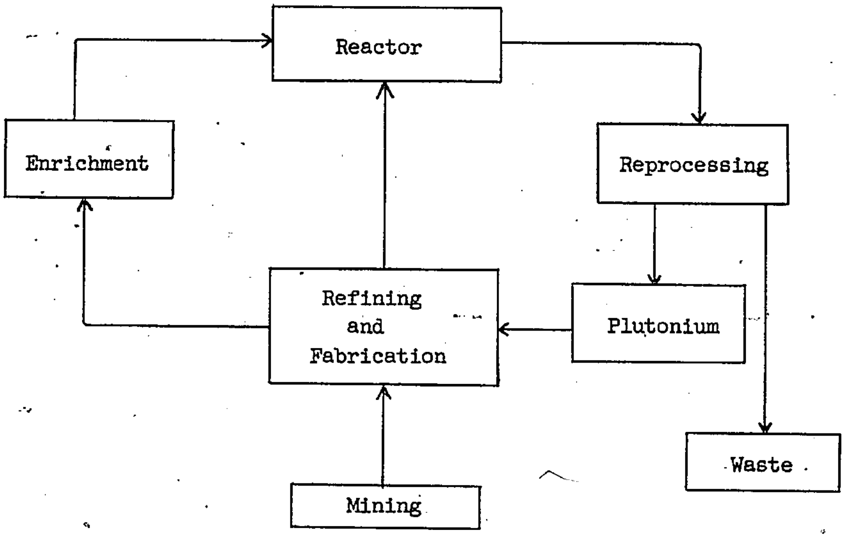
Nuclear Fuel Cycle

The nuclear fuel cycle represents the most basic of the technical variables influencing any national atomic reactor development program. No atomic industry can function without assurance of an adequate fuel supply, technology and sophisticated planning mechanisms notwithstanding. The imperatives of the fuel cycle serve to limit many of the alternative choices that must be made in the course of an atomic energy research and development program. It is important to note that these limitations are imposed on the decisionmaking process in both its technical and political aspects. Appreciation of the importance of the fuel cycle must include an understanding of the continuing communication and interaction between these distinct but dynamically inseparable components.

The fuel cycle, although complex in its dynamics, is simple in construct. The first stage in the fuel cycle is mining. Uranium ore must be extracted from the ground and transported to a refining site. Even this first step in the cycle presupposes extensive commercial and industrial operations with broad political ramifications. Ore deposits must first be located, their ore content determined, and the economic feasibility of extracting the ore estimated. Mining equipment and extractive technology are required before deposits can be exploited. If uranium ores are not available domestically, resources must be sought abroad. If overseas supplies are to be exploited, governments and private firms in the countries involved must reach agreement on the scope of mining operations, on the respective land, labor, and capital investments required, and on the responsibility over the mining operations that will be shared by government

CHART 5

THE NUCLEAR FUEL CYCLE



and private investors on each end. Suitable transport facilities must be made available to move the ore from the mine to the refining site, and a reliable supply route must be found.

Fuel refining and fabrication is the next step in the fuel cycle. Besides the demands in terms of technology and capital, the refining and fabrication processes are subject to certain political concerns. Since uranium ore, quite harmless in its natural state, is concentrated into a fissionable mass during fabrication, public exposure to radioactivity must be guarded against. Moreover, international political agreements have established strict limitations on the amount of fissionable materials a country may hold. A national government must take the responsibility, either directly or in conjunction with private industry, for seeing that such international standards are observed or, perhaps, circumvented.

After the ore is refined into fissionable material it is fabricated into shape suitable for burning in a reactor. Once consumed inside the reactor, the spent, or depleted, fuel is then removed and taken to a reprocessing facility where it is separated into waste and reusable elements. Once again, the political implications of the reprocessing stage are as significant as the formidable technological requirements themselves.

In the first place, the length of time the fuel element is burned inside the reactor helps determine the greater or lesser amount of plutonium that can be extracted from the spent fuel during reprocessing. Since plutonium is of military importance and subject to the same strict accountability as fissionable uranium, reprocessing is a particularly sensitive operation in the fuel cycle. Moreover, for control purposes, it is as important to ascertain the state of the spent fuel before it enters the reprocessing facility as it is to account for the exact amounts of various reprocessed materials that leave the facility. Besides the sensitivity of the reprocessing operation, _per se_, what happens to the reprocessed fuel is also of great interest. If strict accountability of national holdings of fissionable materials is to be realized and diversion, for whatever reason, to be prevented, disposition of reprocessed fuel is critical in a political sense. Finally, while the reusable portion of reprocessed atomic fuel has attracted the most attention to date, the disposition of radioactive waste is not without political significance for the future.

Another stage of the fuel cycle is uranium enrichment. Enrichment is optional depending on the type of reactor selected for use. While some reactors make use of natural uranium, others require uranium fuel in which the fissionable content has been artificially increased, or enriched.

Uranium may be enriched to whatever degree desired, and while weapons-grade uranium requires a high degree of enrichment, uranium for burning in reactors need be enriched only slightly. The difficulty with enrichment technology, and what makes it so significant from a political standpoint, is that the enrichment process is identical for peaceful or for military purposes. Once having acquired enrichment technology, the purpose to which it is turned is strictly a political decision. Uranium enrichment, more than any other stage in the fuel cycle, illustrates the inextricable relationship between politics and atomic technology.

The technological determinants of the fuel cycle interpose themselves between the wish for and the realization of atomic power. How the fuel cycle has influenced the results of this political decision in Japan is examined below.

Mining For a country desiring to obtain nuclear fuel source materials, three possibilities are open: develop resources for domestic extraction, purchase directly from foreign suppliers, or contract with foreign countries to permit domestic mining companies to operate abroad. Japan has investigated all three and has found the latter the most practical and most desirable from a long range standpoint.

The raw materials necessary for nuclear fission are very scarce in Japan. Uranium ore was discovered in Naka-gun, Kyoto Prefecture in September, 1955 and in Tottori Prefecture in December the same year.[1] The following year a three-year uranium prospecting program was initiated which

[1] Sangyo Keizai, Sep. 4, 1955 in DSJP, Sep. 5, 1955, p. 10; Asahi Shimbun, Oct. 16, 1955 in DSJP, Oct. 17, 1955, p. 6; and Yomiuri Shimbun, Dec. 7, 1955 in DSJP, Dec. 7, 1955, p. 14.

eventually surveyed over 77,000 square miles.[1] The richest find was made at the Ningyo-Toge mine on the border of Tottori and Okayama Prefectures.[2] However, even the best Japanese deposits had a low uranium ore content.[3] Although the government encouraged domestic mining operations by purchasing such ore for use in certain research reactors, it was forced to turn to other countries for the bulk of the country's atomic energy raw material needs.[4]

Initially, Japan relied entirely on the United States for its atomic fuel. However, partly because of military security considerations and partly because American estimates of Japan's atomic fuel needs tended to be much more conservative than Japanese estimates, this donor-recipient relationship proved unsatisfactory to the Japanese from the start. For instance, under a short term atomic fuel supply agreement signed in June, 1958 Japan received only half of the twenty grams of Uranium-233 that she had requested, only 100 grams of the nearly 270 grams of Uranium-235 requested, and just 260 grams of plutonium out of the well over 1000 grams that Japanese planners felt they needed.[5]

In the 1960s Japan broadened her purchasing agreements and began to seek fuel supplies from Great Britain and France as well as from the United States. Having several foreign fingers on Japan's electric power switch rather than just one still proved unsatisfactory from the Japanese point of view. By the late 1960s, therefore, Japan began to develop her third

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[1] Approximately half the land area of Japan.

[2] Embassy of Japan, Japan Report, V (March 1, 1959), 10.

[3] Nihon Keizai, Feb. 10, 1960 in DSJP, Feb. 11, 1960, p. 8.

[4] Atoms in Japan, V (May, 1961), 12-13.

[5] Atoms in Japan, III (December, 1959), 9.

alternative, overseas contracts for Japanese mining operations.

Opening foreign countries to Japanese mining firms was only one result of the reassessment of atomic fuel procurement problems which was undertaken as part of a general overhaul of the reactor development schedule in 1966 and 1967. Early in 1967 the Atomic Energy Committee of the Overall Energy Research Council within the Ministry of International Trade and Industry decided to pursue actively a solution to the atomic fuel supply problems facing the country.[1] Under the government's plan, MITI would be in charge of overall administrative regulation of atomic fuel production, while delegating to different private firms authority for specific aspects of the program. Nuclear fuel companies[2] would be licensed by the Science and Technology Agency.[3] MITI would, furthermore, establish a reserve fund and create a system of special tax deductions designed to encourage domestic atomic fuel development. Additionally, all electric companies were required to maintain a certain level of monetary reserves in order to stabilize electric power costs over the transitional period when atomic fuel would begin replacing fossil fuels.[4]

At the same time, a Nuclear Fuel Committee was established within the JAEC under Arisawa Hiromi. At its first meeting in June, 1967 the Committee made public its plans for a comprehensive study of the atomic fuel situation.[5]

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[1] Atoms in Japan, XI (July, 1967), 20.

[2] The private firms engaged in fuel production were the Japan Nuclear Fuel Company, Mitsubishi Metal and Mining, Mitsubishi Atomic Energy Industries, Sumitomo Metal and Mining Company, Sumitomo Electrical Industries, and Furukawa Electric Company.

[3] Nihon Kogyo, Mar. 11, 1968 in DSJP, Mar. 11, 1968, pp. 25-26.

[4] Tokyo Shimbun, Mar. 24, 1968 in DSJP, Mar. 25, 1968, p. 17.

[5] Atoms in Japan, XI (July, 1967), 20-21.

The report was published the following year in March. It emphasized, first of all, the continuing partnership between private firms and the government.[1] The Federation of Electric Power Companies had recently sent a Nuclear Fuel Study Team to North America and Western Europe, and had concluded that, with close cooperation between government and business, any temporary shortages in atomic fuel supply could easily be overcome. It had recommended a combination of spot buying, long term contracts and joint development programs.[2]

The optimism of the electric power companies was not entirely shared by everyone concerned with fuel resources. The STA, for instance, was reported to be anxious about the electric companies' apparent lack of concern for continued dependence upon the United States for fuel supplies, and about the companies' tendency to let the economics of the fuel cycle overshadow the need for building an autonomous supply and servicing capability inside Japan. Others were impatient to get on with exploration of possible fuel deposits in other parts of the world.[3]

While recognizing that dependence on American fuel resources and reactor technology was unavoidable for the time being, the Nuclear Fuel Committee also outlined in its report a ¥15.3 billion ($42.5 million) research and development program designed to alter the present one-sided relationship. Uranium enrichment techniques, both gaseous diffusion and centrifuge, were given priority and an ¥8.6 billion ($23.9 million) budget. In 1972[4] both

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[1] Nihon Keizai, June 21, 1968 in DSJP, June 25, 1968, p. 9.

[2] Atoms in Japan, XI (July, 1967), 20-23.

[3] Asahi Shimbun, Apr. 14, 1967 in DSJP, Apr. 17, 1967, p. 12.

[4] The date was postponed until 1975 early in 1971 when it appeared that freer international exchanges of enrichment technology were in the offing. See Yomiuri Shimbun, Mar. 19, 1971 in DSJP, Mar. 23, 1971, p. 1.

techniques were to be assessed on past performance and a decision made as to future development. Plutonium fuel research was also given priority by the Nuclear Fuel Committee. The Power Reactor and Nuclear Fuel Development Corporation was charged with developing fuel reprocessing capabilities. Finally, in view of the Nonproliferation Treaty, the report cited the need for devising more efficient inspection methods.[1]

While debate continued over the timing and priority of reactor and fuel programs, contracting with foreign countries for Japanese exploitation of atomic fuel resources began in earnest. The first contract for joint prospecting was signed between Mitsubishi Metal and Mining and Rio Algom Mines of Canada in December, 1966. The three year agreement provided for an even division of all uranium mined. Meanwhile, other survey teams were exploring Australia,[2] Canada, Mexico, Brazil, and Argentina.[3]

In 1970, private firms within the Japanese atomic energy industry set up the overseas Uranium Resources Development Company (OURDC)[4] to represent them collectively in negotiations with atomic energy organizations in other countries. OURDC began operating on May 15 with ¥2.4 billion ($6.7 million) authorized capital, one-third contributed by the nine electric power companies, one-third by non-ferrous metal and mining companies, and one-third by the Industrial Bank of Japan and six manufacturing and trading

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[1] Nihon Keizai, June 21, 1968 in DSJP, June 25, 1968, pp. 9-10; Mainichi Shimbun, Mar. 28, 1968 in DSJP, Mar. 28, 1968, p. 14; and Atoms in Japan, XII (April, 1968), 10-12.

[2] Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., p. 20; and JAEC, Fourteenth Annual Report, op. cit., pp. 41-42.

[3] Atoms in Japan, XI (September, 1967), 24.

[4] Yomiuri Shimbun, Feb. 20, 1970 in DSJP, Feb. 20, 1970, p. 6.

firms.[1]

Refining and fabrication During the fabrication stage of the nuclear fuel cycle the uranium fuel (either natural uranium or enriched uranium) is converted to uranium oxide powder, pressed into pellets and inserted into metal tubing. Japan first acquired the fuel fabrication technology in the late 1960s through joint operation with the United States. The Japanese government has encouraged private firms to develop this capability, but still regulates them closely. Applicants must convince the government that "fabricating capacity is not to grow in excess," that the firm possesses the technological expertise required for the job, and that proper safety precautions have been taken.[2] The question of excess production is especially sensitive in terms of the restrictions contained in the Nonproliferation Treaty which Japan has signed.[3]

At the present time, three industrial combines have entered the enriched fuel fabrication business. The Japan Nuclear Fuel Corporation, the first fuel fabricator, was established in 1967. It is a joint stock company comprised of Hitachi, Toshiba, and General Electric (U.S.) with holdings divided 30:30:40 respectively. MITI was not anxious for an American firm to be a partner in such a sensitive national project. However, General Electric's technical assistance was necessary if this phase of development was to proceed on schedule. To safeguard Japanese interests it was stipulated that the corporation would function according to Japanese commercial law and that the Japanese government would approve any venture into auxiliary fields. General Electric's 40 per cent holding gave it a veto on policy deliberations

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[1] Atoms in Japan, XIV (May, 1970), 9-10.

[2] JAEC, Fourteenth Annual Report, op. cit., p. 43.

[3] Atoms in Japan, XIV (May, 1970), 13.

discussed at shareholders' meetings.[1] Since 1967 Sumitomo Electric Industries and Mitsubishi Atomic Power Industries have also become fuel fabricators, the former in conjunction with the United Nuclear Corporation and the latter with Westinghouse.[2]

Reprocessing After atomic fuel is burned in a reactor, there are still valuable uranium and plutonium deposits present among the waste products. The Japanese have been engaged in fuel reprocessing research since the beginning of their atomic energy development program. For instance, in 1960 researchers at JAERI invented a "semi-drying method" for extracting fissionable materials from atomic wastes. This technical triumph was expected to give added impetus to the reprocessing program.[3] In 1964 it was decided to go ahead with a full fledged reprocessing facility. JAEC Commissioner Arisawa was especially convinced of the need for a "complete nuclear fuel cycle in Japan."[4]

In March, 1969 JAERI reported that it had arrived at a technique for producing plutonium from used reactor fuel with better than a 96 per cent purity.[5] Japan's first plutonium production plant went into operation in February, 1972. Its plutonium output is to be used to fuel several generations of experimental reactors now being developed in Japan.[6] With

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[1] Sankei Shimbun, Apr. 13, 1967 in DSJP, Apr. 15, 1967, p. 10.

[2] Atoms in Japan, XIV (May, 1970), 11-13; and Atoms in Japan, XV (June, 1971), 15-16.

[3] Tokyo Shimbun, Mar. 20, 1960 in DSJP, Mar. 20, 1960, p. 18.

[4] Atoms in Japan, IX (July, 1965), 9; and Atoms in Japan, IX (August, 1965), 11-15.

[5] Yomiuri Shimbun, Mar. 27, 1969 in DSJP, Mar. 27, 1969, p. 5.

[6] Japan Times Weekly, Feb. 12, 1972, p. 11.

the rapid growth of atomic reactors scheduled for the 1970s and 1980s, Japan should soon have a very respectable plutonium bank.[1]

One reason the Japanese acquired plutonium technology so quickly was the failure to find adequate plutonium sources available with their traditional fuel supplier, the United States. Japan has not been encouraged to rely on American plutonium. Agreements made in the 1960s limited the supply to 300 kilograms up to 1970. The United States was reluctant to make a greater commitment, it was said, because it could not guarantee delivery after that date since atomic fuel would be owned privately. The Japanese, however, have also expressed the opinion that American fear of military diversion by Japan was partly the cause of its reticence.[2]

Enrichment technology Uranium enrichment is the most politically sensitive step in the nuclear fuel cycle. Enriched fuel, unlike natural uranium, can be of military value depending upon the percentage of enrichment; i. e., depending on the amount of fissionable Uranium-235 contained within the fuel element. Most enriched fuel reactors now in use or under development require fuel enriched less than 5 per cent, while weapons-grade uranium must be at least 90 per cent or more. Thus, it is not possession of enriched reactor fuel itself which is the problem. Rather, it is the location of enrichment facilities that has been a major bone of contention since the late 1960s between atomic power spokesmen in non-nuclear-weapon countries and those dedicated to the cause of nuclear nonproliferation. Until recently, only the United States and the Soviet Union had mastered enrichment

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[1]Gilinsky and Langer estimate that 0.2 to 0.3 kilograms of plutonium are produced each year for every 1,000 kilowatts of reactor capacity, when the reactor is operating at an average 80 per cent capacity; see their study, The Japanese Civilian Nuclear Program, op. cit., pp. 18-19.

[2]Tokyo Shimbun, Oct. 29, 1967 in DSJP, Oct. 31, 1967, p. 5.

technology and both opposed its dissemination. The great financial investment required to construct an enrichment plant was sufficient to discourage smaller states from pursuing any such capability until recently. However, centrifuge technology has changed all that.

There are two methods of uranium enrichment available today.[1] Gaseous diffusion, the traditional method, requires a large initial capital investment and is economical only on a large scale. With this enrichment method, uranium is converted to gaseous form and then compressed through a porous barrier. The fissionable Uranium-235, being lighter in weight, passes through the barrier more quickly. By repeating this process thousands of times, the uranium isotopes are eventually separated.[2] Gaseous diffusion plants are quite expensive to build and consume enormous amounts of electricity and cooling water while operating.[3] Only countries with a most ambitious atomic energy program can even consider developing a domestic gaseous diffusion enrichment complex.

By contrast, the gas centrifuge is practical on a much smaller scale and with lower building and operating costs. As with the diffusion process, uranium fuel is converted to a gas before being put into the centrifuge. Then, utilizing the principle of centrifugal force, the heavier Uranium-238

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[1]A third method, chemical separation, has been studied but there is no evidence to suggest that anyone has yet come close to perfecting this technology. Because Uranium-238 and Uranium-235 have the same chemical properties, separating them by a chemical process would be extremely difficult. Separation of the two isotopes by physical means, diffusion and centrifugal force, have proved to be more practical.

[2]A good description of atomic energy technology, in terms understandable to the layman, can be found in Mason Willrich, Global Politics of Nuclear Energy (New York: Praeger, 1971), pp. 16-18.

[3]Ibid. The cost of a single American gaseous diffusion plant in the mid-1960s was estimated at approximately $540 million. See Mainichi Shimbun, Aug. 19, 1967 in DSJP, Aug. 22, 1967, pp. 1-2.

is forced to the outer edge of the centrifuge cylinder while the lighter Uranium-235 remains closer to the center.[1] The centrifuge is only about one meter in length, and since the size of the plant depends upon the number of centrifuges used, the gas centrifuge method of fuel enrichment is capable of being instituted on a much smaller scale than is the gaseous diffusion operation. In addition to a smaller physical plant and smaller initial investment, the centrifuge technology requires from one-fifth to one-tenth the amount of electricity to operate as does a gaseous diffusion plant of similar capacity.[2]

Many modernizing countries look upon centrifugal uranium enrichment as a boon. It allows a country to enter the atomic power era on a modest basis, but with up-to-date technology. It also offers the possibility of producing domestically sufficient atomic energy fuel for home consumption needs, while avoiding unwelcome dependency on a foreign state, probably one of the great or superpower class. The military potential of fuel enrichment, however, has led the United States to discourage proliferation of centrifuge technology. It is easy for any state that has enrichment facilities to use them to produce weapons grade enriched uranium as well as the slightly enriched fuel used in most reactors. The gas centrifuge has congered up the image of a world of small and medium nuclear-weapon states. Even should such an eventuality be forestalled, as the 1968 Nonproliferation Treaty attempts to do, widespread acquisition of the gas centrifuge technique would mean that a host of smaller states would be significantly cutting down the lead time required to produce nuclear weapons.

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[1]Willrich, Global Politics of Nuclear Energy, op. cit., pp. 16-18.

[2]Mainichi Shimbun, Aug. 19, 1967 in DSJP, Aug. 22, 1967, pp. 1-2; and Yomiuri Shimbun, Apr. 3, 1969 in DSJP, Apr. 4, 1969, p. 14.

The United States has struggled with the centrifuge question since the late 1950s. In 1958, at the Second International Conference on the Peaceful Uses of Atomic Energy, West German scientists first disclosed their research findings on the centrifugal separation process. The United States, at that time, requested the information be safeguarded as a state secret by the German government,[1] and continued to discourage other countries from pursuing similar research. In March, 1967 the U.S. AEC prohibited further private research on the centrifuge in the United States,[2] and suspended all joint U.S.-Japan work in this area. At the same time, the United States called for international consultations, including Japan, to prevent the further spread of centrifuge technology.[3]

The Japanese centrifuge research program began in the 1950s at the Institute of Physical and Chemical Research where the first experimental separation unit was completed in 1957.[4] After that, research on commercial centrifuges was directed by Professor Oyama Yoshitoshi at the Tokyo Institute of Technology with practical development centered in the Nippon Atomic Industry Group and Toshiba Turbine Company.[5] Recently, testing has been carried out under the direction of the Power Reactor and Nuclear Fuel Development Corporation at Tokai-mura.[6]

In view of the fact that American production of enriched atomic fuel

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[1] Asahi Shimbun, Apr. 1, 1969 in DSJP, Apr. 2, 1969, pp. 2-3.

[2] Mainichi Shimbun, Aug. 19, 1967 in DSJP, Aug. 22, 1967, pp. 1-2.

[3] Yomiuri Shimbun, Mar. 16, 1968 in DSJP, Mar. 22, 1968, pp. 5-7.

[4] Atoms in Japan, XIII (September, 1969), 12-13.

[5] Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 23-24.

[6] Yomiuri Shimbun, Apr. 3, 1969 in DSJP, Apr. 4, 1969, p. 4; and Mar. 16, 1968 in DSJP, Mar. 20, 1968, pp. 5-7.

is expected to run short of international demand within the next ten years,[1] and in light of its reluctance to distribute enriched fuel in the quantities requested, Japan, as well as certain Western European countries, have been encouraged to pursue their own individual domestic separation facilities. Nakasone Yasuhiro urged as much when he returned from a European inspection tour in the fall of 1967.[2]

The following May a Nuclear Fuel Consultative Council was established under the direction of JAEC Acting Chairman Arisawa, to coordinate the centrifugal research program unofficially, in spite of American objections. The Council estimated that Japan's enriched fuel needs by 1985 would reach 2,000 tons per year, one-third of current American production capacity.[3] An American decision to raise the price charged for enriching fuel for foreign purchasers from $26.00 to $28.70 per kilogram was added reason for Japan to turn to domestic production.[4]

The JAEC Fourteenth Annual Report officially confirmed the decision to build an independent fuel enrichment capability. Stating that "it is not desirable . . . to depend upon U.S. supply only . . . ," the Report indicated that the technical feasibility of both the diffusion and centrifuge methods would be determined by 1972, and one or the other method chosen as the primary path for producing a domestic supply thereafter.[5] By April, 1972

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[1] A Rand study by Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 44-45, recently predicted that by 1980 demand for enriched uranium in Japan alone would reach one-quarter of total American production at that time.

[2] Nihon Keizai, Oct. 27, 1967 in DSJP, Oct. 27, 1967, p. 33.

[3] Yomiuri Shimbun, Mar. 16, 1968 in DSJP, Mar. 16, 1968, p. 19.

[4] Nihon Keizai, July 16, 1970 in DSJP, July 17, 1970, pp. 7-8.

[5] JAEC, Fourteenth Annual Report, op. cit., p. 5.

the PNC had successfully tested centrifugal separators,[1] and shortly thereafter the JAEC announced its decision to proceed with a full scale centrifugal enrichment program. A pilot project was scheduled for fiscal 1973 at a cost of ¥7 billion, and development is to begin in full the following year. When completed around 1980, Japanese enriched uranium is expected to be fully competitive with enriched fuels produced by other countries. Some 10,000 separating devices are planned with a production capacity of fifty tons of enriched uranium annually. Meanwhile, research and development is to continue on the alternative gaseous diffusion method of separation so that Japan can share in joint international projects of the type presently being talked about in the United States.[2]

The Japanese decision to seek its own enriched fuel supply was echoed in March, 1970 by a treaty between Great Britain, West Germany and the Netherlands to engage in a joint uranium enrichment project.[3] Fear of being forced to compete alone against the United States and Western Europe evidently had a part in prompting Japan to propose its own joint development scheme. During a meeting in Washington in September that year with Secretary of State Rogers, Undersecretary Johnson and Presidential aide Kissinger, Nakasone Yasuhiro (at the time, Director of the Japan Defense Agency) urged a joint U.S.-Canadian-Australian-Japanese development program. The American officials appeared receptive to the idea and Undersecretary Johnson suggested that the United States would consider releasing some of

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[1] Atoms in Japan, XVI (February, 1972), 35.

[2] Atoms in Japan, XVI (August, 1972), 10-13, and (November, 1972), 16-19; Japan Times Weekly, Feb. 3, 1973, p. 8.

[3] Yomiuri Shimbun, Mar. 23, 1970 in DSJP, Mar. 26, 1970, p. 2.

its enrichment techniques.[1] This proposal was also favorably received in Japan.[2] The following year, at the JAIF annual meeting in Tokyo, not only the United States but also France and Great Britain made available some hitherto classified information on enrichment techniques. The discussions were in general encouraging to the idea of more expanded multilateral research and development.[3]

Uranium enrichment is a legitimate concern of peaceful atomic power planners. However, widespread dispersal of national uranium enrichment facilities would be inconsistent with the principle embodied in the Nonproliferation Treaty of limiting control over those aspects of atomic energy technology with military potential to the present nuclear-weapon states. The problem could possibly be handled through enhanced safeguard techniques by the International Atomic Energy Agency (IAEA). Also, in the case of Japan, a domestic program would make her an economic competitor of the United States in the fuel enrichment field, a role the Japanese nuclear industry has not actively sought.[4] It is understandable why Japan welcomed the announcement in September, 1972 of a joint Japanese-American gaseous diffusion enrichment plan. To meet immediate uranium needs in Japan and to help offset a growing American trade deficit, Japan agreed to purchase $320 million worth of enriched uranium. For long range needs, a $1 billion gaseous diffusion plant is to be built and operated jointly in

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[1] Tokyo Shimbun, Sep. 11, 1970 in DSJP, Sep. 12, 1970, p. 23; and Mainichi Shimbun, Nov. 16, 1970 in DSJP, Nov. 17, 1970, p. 5.

[2] Nikkan Kogyo, Sep. 27, 1970 in DSJP, Sep. 28, 1970, p. 23.

[3] Yomiuri Shimbun, Mar. 19, 1971 in DSJP, Mar. 23, 1971, p. 1.

[4] Gilinsky and Plesset, "Comments on the Japanese Nuclear Program," op. cit., pp. 6-7.

the United States.[1] The new bilateral (and in time, perhaps, multilateral) formula may go far in alleviating Japanese concerns over future sources of enriched uranium fuel. However, it is highly unlikely that Japan will put a damper on its own independent enrichment program which is presently seen as the primary source of enriched fuel for the future.

The U.S. AEC recently announced that it intends to give private industry the opportunity to finance and operate uranium enrichment plants. The program, which envisions approximately ten plants and $15 billion investment when completed, would be regulated by the United States government only to the point that the degree of fuel enrichment would be monitored to be sure it was of no military potential. The AEC even left open the possibility that the gas centrifuge, which utilizes approximately ten times less electricity than the diffusion method of separation, might be considered for use by private industry.[2]

<u>The future of the fuel cycle</u> Fuel policy in Japan is still undergoing debate. A recent announcement by the U.S. AEC that after 1973 the American supply of enriched fuel will be restricted due to failure of supply to meet demand[3] increased the sense of urgency but did nothing to sort out conflicting projections as to need or suggestions as to how best to meet those needs. A recent JAEC Special Advisory Committee report on uranium procurement suggested that one-third of Japan's needs for enriched fuel should be met by Japanese developed production.[4] The JAIF seems to favor

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[1] <u>Washington Post</u>, Sep. 2, 1972, p. A1.

[2] <u>Washington Post</u>, Dec. 9, 1972, p. A3.

[3] <u>Nihon Kogyo</u>, Mar. 18, 1971 in <u>DSJP</u>, Mar. 19, 1971, p. 7.

[4] <u>Atoms in Japan</u>, XV (July, 1971), 19-21.

a 50 per cent self-sufficiency.[1] Other estimates as to total need for enriched fuel vary widely. By 1975 projected annual needs range from 2,000 to 2,800 tons; in 1980 estimates are from 2,000 to 6,000 tons; and for 1985 yearly expected consumption varies from between 8,000 and 13,000 tons.

Whatever the actual needs turn out to be, Japan will need to act quickly and boldly if its atomic energy industry is not to suffer. Japan can be expected to put much greater effort into the entire spectrum of atomic energy development. It is reported that ¥1.3 trillion ($3.6 billion) is to be allocated for the domestic program throughout the decade of the 1970s.

Japan has consistently sought multilateral cooperative agreements in the atomic energy field. As early as 1965, editorials in Atoms in Japan came out in strong support of international cooperation across the board, and specifically in meeting enriched uranium needs.[2] The United States has indicated its willingness to join Japan and other countries in sharing atomic technology, provided agreements on financing and secrecy can be met.[3] The Soviet Union has already approached Japan on the subject. Deputy Chairman Gubishiani of the State Science and Technology Committee made what the Japanese considered a formal proposal to sell enriched uranium to Japan at 25 per cent below the American price when JAEC Chairman Hiraizumi was in Moscow in September, 1971. Rather than a simple purchase agreement, however, the Japanese preferred a joint development project with the Soviet Union

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[1] Tokyo Shimbun, Dec. 8, 1970 in DSJP, Dec. 9, 1970, p. 23.

[2] Atoms in Japan, IX (July, 1965), 1-4; see also, Atoms in Japan, IX (February, 1965), 1-4.

[3] Atoms in Japan, XV (August, 1971), 2.

providing enrichment technology and Japan the physical plant.[1] The proposal has been under study by both countries since that time, and in April, 1973 the Energy Countermeasures Committee of the Keidanren is scheduled to go to the Soviet Union to continue the negotiations.[2]

The problem of nuclear waste disposal has not been touched upon. In Japan, waste problems have until recently been largely ignored. The seriousness of the waste disposal problem is just beginning to be recognized by governments, in Japan as elsewhere, as the prospect of proliferating atomic reactors throughout the world becomes imminent. Up to now Japan has been pumping low level atomic waste into the Pacific Ocean. Its major waste disposal problems have been taken care of through a contract with Great Britain.[3] The long range aspects of waste disposal are now being reviewed, and a plan for handling low level wastes is expected to be ready within a few years. For more highly radioactive materials, the JAEC expects to have a comprehensive plan available by 1980. Several small, uninhabited islands off the main archipelago are being considered as one alternative disposal site. The JAEC anticipates that a public or special corporation will have to be set up to handle the waste disposal question.[4]

As a sure sign that much more is to be heard on the subject of atomic fuel, in early 1972 three new committees on the fuel question were set up.

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[1]Mainichi Shimbun, Sep. 19, 1971 in DSJP, Sep. 22, 1971, p. 29.

[2]Yomiuri Shimbun, Jan. 17, 1973 in DSJP, Jan 18, 1973, p. 28.

[3]Thomas O'Toole, "Nuclear Garbage Disposal: A Buried Problem," Washington Post, Sep. 19, 1971, p. D5.

[4]Atoms in Japan, XVI (February, 1972), 13; and (October, 1972), 15-16.

Two of these, formed by the JAEC in January, are to investigate Japanese participation in international projects and to study the "objectives, scope and magnitude of the domestic program."[1] A third committee, created by the Central Research Institute of the Electric Power Industry, is composed of representatives from nineteen corporations and funded by the government. This group is to review Japan's enrichment needs especially from the standpoint of joint projects with the United States and France.[2]

Reactor Development

The first electric power generation by means of an atomic reactor in Japan occured at 4:59 P.M. on October 26, 1963 at Tokai-mura.[3] Although the Japan Atomic Power Company (JAPCO) reactor was for demonstration purposes only, the event was hailed as a landmark in the history of atomic power in Japan. By coincidence, October 26 is also the date on which Japan became a member of the International Atomic Energy Agency in 1956. Thus, October 26 has been observed as Atomic Energy Day since 1964.

Commercial reactor development The first production of commercial power in Japan occured in July, 1966 when the British-made Calder-Hall reactor at Tokai-mura went critical. The natural uranium fueled Calder-Hall had originally been selected as the model for early development of atomic power in Japan, but by 1959 the JAEC had decided to import American enriched uranium type reactors as well.[4] The first American-made reactor went

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[1] U.S. AEC (Tokyo Office), Biweekly Report, Feb. 10, 1972, pp. 1-2.

[2] Atoms in Japan, XVI (April, 1972), 23.

[3] Atoms in Japan, VIII (February, 1964), 26.

[4] Yomiuri Shimbun, Oct. 14, 1959 in DSJP, Oct. 14, 1959, p. 7.

critical in October, 1969 at Tsuruga. Both of these reactors were contracted for by JAPCO which had been set up in November, 1957 to oversee the importation, installation and operation of foreign made reactors.[1] JAPCO was financed 80 per cent by private sources and 20 per cent by the government through the Electric Power Development Corporation.

Since 1969 orders for commercial power reactors have been made by private Japanese electric power companies rather than by JAPCO. Japanese private industry has also been taking a larger and larger share in the production of reactor components. Whereas the first JAPCO Calder-Hall reactor contained only 35 per cent domestically produced components, reactors scheduled for operation in the next few years are expected to be as much as 90 per cent of Japanese manufacture. Certain components, like control rods and drive mechanisms, coolant circulation equipment, and some steam valves will still have to be imported for some time, either because of the sophisticated technology involved or because the small domestic demand for them makes production costs prohibitive.[2]

<u>The ATR-FBR program</u> Reactor development in Japan since 1968 has had one overriding goal, the fast breeder reactor.[3] The FBR is considered to be "an ideal type of power reactor which will be able to solve" the fuel problem in Japan.[4]

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[1] Atoms in Japan, I (No. 4, 1959), 3.

[2] JAEC, Fourteenth Annual Report, op. cit., pp. 35-37.

[3] The fast breeder is so named because it makes use of the neutrons emitted during nuclear fission directly. Traditional thermal reactors make use of a moderator, normally water or graphite, to slow down the neutrons before they are used. The FBR also produces, or breeds, plutonium which can be used, in turn, to feed other reactors.

[4] JAEC, Fourteenth Annual Report, op. cit., p. 16.

TABLE 4

NUCLEAR REACTOR DEVELOPMENT SCHEDULE
Through 1974

Company	Name & Location of Plant	Date Critical	Output (KW)	Percent Domestic Production
JAPCO	JPDR Tokai-mura	10-63	12,500	n.a.*
JAPCO	Tokai Tokai-mura	7-66	166,000	35
JAPCO	Tsuruga Fukui Pref.	10-69	331,000	55
Tokyo	Fukushima No. 1 Fukushima Pref.	10-70	460,000	56
Kansai	Mihama No. 1 Fukui Pref.	10-70	340,000	59
JNSDA	"Mutsu" Aomori Pref.	12-71	36,000	n.a.*
Kansai	Mihama No. 2 Fukui Pref.	6-72	500,000	74
Tokyo	Fukushima No. 2 Fukushima Pref.	5-73	784,000	51
Chugoku	Shimane No. 1 Shimane Pref.	6-74	460,000	90
Kansai	Takahama No. 1 Fukui Pref.	8-74	826,000	62
Tokyo	Fukushima No. 3 Fukushima Pref.	12-74	784,000	90
	*Not available			

Source: Japan Atomic Energy Commission, Fourteenth Annual Report: 1969-1970 (Tokyo: Japan Atomic Energy Commission, n.d.), pp. 36, 105.

The ATR.--The fast breeder is still for the future, however, and there are many as yet unanswered questions concerning its development. To fill the gap between present generation reactors and the FBR, the advanced thermal reactor has been selected. Some atomic power strategists, both inside Japan and abroad, have suggested that the ATR is really not essential and that it would be better to improve the commercial reactors presently in operation and then move directly to the FBR in the 1980s.[1] However, a number of considerations encouraged atomic power planners to take a more expansive, and at the same time, more expensive approach. The ATR-FBR program was designated a "national project" in the 1967 Long Range Plan, and was approved as a basic development policy by the Prime Minister in March, 1968. The PNC was set up as the "central executive organization" for the joint development plan. PNC facilities at Oarai, Ibaraki Prefecture began full scale operation in March, 1970.[2]

The ATR is attractive in one respect in that it is expected to lower costs of electric power. Rather than requiring expensive enriched uranium fuel as is used in present American-type thermal reactors, the ATR will use natural uranium fuel slightly enriched with plutonium. Additionally, it will make use of the valuable plutonium which has been accumulating in the spent fuel of present day reactors and which would otherwise have little economic value until the age of the FBR.

The ATR is attractive for a second reason. Since it uses natural uranium rather than enriched fuel which is obtainable only from a limited number of suppliers, Japan can draw on a much wider fuel market when the ATR begins operation. The ATR should also be a good export item for countries which, like Japan, want advanced equipment and a minimum dependence on any single fuel source.

Third, the ATR is insurance against some unexpected delay in FBR development. It will be some time before the FBR reaches the stage of practical operation. Atomic power planners in Japan have never placed all

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[1]See, for instance, Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 34-37.

[2]JAEC, Fourteenth Annual Report, op. cit., p. 16.

their eggs in one basket, and they are not willing to risk being left twenty years behind technologically should the FBR fail in the mid-1980s. Finally, the ATR project, planned, manufactured, and operated in Japan, will give Japanese technicians and administrators invaluable training which they will need as atomic power expands rapidly in the last quarter of the century.[1]

The FBR.--The FBR's unique feature is that it produces more fuel than it consumes. Thermal reactors also produce Plutonium-239 in the fission process, but the breeding ratio of fuel produced to fuel consumed varies from about 0.4 to 0.8, but definitely is less than 1.0. In other words, more fuel is consumed than is produced. Fast breeders, however, yield well over the one-to-one ratio of fuel produced for fuel consumed. An average ratio of fuel production is about 1:1.4.[2] The Japanese breeder model is expected to have a breeding ratio above 1.2.[3]

The FBR is also more economical in its use of fuel than are thermal reactors. Fast breeders are fueled with a core of plutonium (approximately three kilograms per thousand kilowatts of power) which is surrounded by a blanket of Uranium-238. It is the Uranium-238 that absorbs neutrons and becomes Plutonium-239.[4] Fuel is consumed at better than 80 per cent in the fast breeder, while thermal reactors using only the rare Uranium-235 utilize

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[1] Atoms in Japan, XIII (November, 1969), 9-10; Japan Atomic Energy Commission, Atomic Energy White Paper for 1971, trans. in SSJM (December, 1971), 20-30, passim.; and Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 34-37.

[2] Willrich, Global Politics of Nuclear Energy, op. cit., pp. 107-08.

[3] JAEC, Fourteenth Annual Report, op. cit., p. 28.

[4] Willrich, Global Politics of Nuclear Energy, op. cit., pp. 107-08; and Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 30-31.

less than 1 per cent of the total uranium mined.[1] In short, the FBR promises much more economic use of fuel than present generation reactors, it provides a way for countries without large uranium deposits and without expensive enrichment facilities to sustain an independent atomic power program, and it overcomes the problem of fast diminishing world resources of fuel.

The Japanese plan to have commercial electrical power output from fast breeders by 1985, approximately five years behind the United States and Western Europe. The "Fugen" ATR prototype is programmed to be in operation in 1974 with 200,000 kilowatts of power. At the same time, the "Joyo" experimental FBR will begin operation, to be followed by the 310,000 kilowatt "Monju" FBR prototype in 1977.[2] The fast breeder reactors will not be immediately self-sustaining. Under normal operation it takes approximately ten years for enough plutonium to accumulate in one FBR to fuel another reactor of the same size. However, plutonium is being produced as a by-product of current reactor operations, and these plutonium stockpiles will be available for the first generation of FBR's in the 1980s. It has been noted by fuel cycle experts that the ten years it takes for "plutonium doubling" is about the same length of time it takes for electrical demand to double.[3] Thus, assuming that consumption increases at a steady rate, and that the FBR is operational by 1980-1985, fast breeder technology would seem to offer great promise for alleviating the fuel crisis in electrical power before the end of the century.

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[1] Tokyo Shimbun, Nov. 15, 1967 in DSJP, Nov. 22, 1967, pp. 37-38.

[2] JAEC, Fourteenth Annual Report, op. cit., p. 17.

[3] Gilinsky and Langer, The Japanese Civilian Nuclear Program, op. cit., pp. 30-31; and Willrich, Global Politics of Nuclear Energy, op. cit., p. 113.

Nuclear fusion Nuclear fission technology is being looked to to solve the energy crisis for the forseeable future. However, as a long range prospect, nuclear fusion has an even greater attraction. In addition to its potential for power generation, fusion holds out the possibility of solving the hazards of radioactive pollution and of industrial waste products in general. While the fusion process would involve radioactive material within the reactor, its waste products would be mostly non-radioactive helium. Research is also being conducted on ways to use nuclear fusion to separate materials into their basic physical elements. Should this prove possible, a society would be able to break down all its waste materials into usable products.[1]

Following the Second Geneva Conference on Peaceful Uses of Atomic Energy in 1958, where the results of fusion research were made public, the Japan Science Council set up a Special Committee on Nuclear Fusion and urged the government to fund a fusion research program. In 1961 the Institute of Plasma Physics was established at Nagoya University with financial support from the Ministry of Education. The JAEC initiated a seven-year fusion research program at Tokai-mura beginning in 1967 with a ¥3.3 billion ($9.2 million) budget.[2] In July, 1968 fusion research was designated a "special integrated research" project within the categories set up in the 1967 Long Range Development Plan.[3] The Plasma Research Institute recently succeeded in causing a fusion reaction in solid deuterium by using laser beams to heat the material to 10 million degrees centigrade for 1 billionth of a second.[4] While encouraging from a theoretical scientific viewpoint, in Japan as

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[1]Willrich, Global Politics of Nuclear Energy, op. cit., pp. 168-69.

[2]Atoms in Japan, XV (October, 1971), 5-11.

[3]JAEC, Fourteenth Annual Report, op. cit., p. 68.

[4]U.S. AEC (Tokyo Office), Biweekly Report, July 30, 1971, p. 1.

TABLE 5

BUDGET FOR NUCLEAR FUSION RESEARCH
(Millions of Yen)

1961-1964	1965	1966	1967	1968	1969	1970	1971 (to Oct.)
1,258	235	295	327	325	455	684	878

Source: Atoms in Japan, XV (October, 1971), p. 10.

elsewhere, nuclear fusion is still far from a practical application stage. The United States and the Soviet Union have been encouraged lately, however, by significant research breakthroughs. The U.S. AEC recently reported a highly successful experiment in which a fusion reaction was sustained for one-fiftieth of a second at 25 million degrees. Fusion reaction, to be commercially feasible, must achieve a temperature of 100 million degrees. The U.S. AEC now feels confident that nuclear fusion research has progressed to the point where it can be demonstrated in practical terms by 1980-1982. The agency is talking in terms of commercial fusion reactors by the year 2000.[1]

[1] Washington Post, Dec. 2, 1972, p. A2.

CHAPTER V

INTERNATIONAL TECHNOLOGY EXCHANGE

The success of Japan's atomic energy program is due in no small part to the wide-ranging network of research and development assistance agreements which the government has signed with foreign countries. Certainly, the currently available advanced state of the art in Japan could not have been reached without outside stimulation. All sectors of the Japanese atomic energy community acknowledge the significance of imported technology, and businessmen in atomic energy related fields have been most enthusiastic proponents of liberal trade and import policies. In this, they are in character with Japanese business leaders generally who, in Dimock's opinion, "since the end of World War II have become increasingly internationalist in outlook, more so, perhaps, than any other world group save those devoted to peacekeeping and the United Nations."[1]

The United States and Atoms for Peace

The United States, of course, has been the most important contributor to Japan's rapidly maturing capability in atomic technology. Japanese research and development in the field was cut off in 1945 by Occupation Authorities and the equipment destroyed. However, in November, 1949 the United States began to encourage renewed research, albeit on a limited basis, and approved the transfer of radioisotopes to Japan.[2]

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[1]Dimock, The Japanese Technocracy, op. cit., p. 30.

[2]Yanaga, Big Business, op. cit., p. 178.

Large scale American support for a full-fledged Japanese atomic energy program began after President Eisenhower's Atoms for Peace speech at the United Nations General Assembly in December, 1953. It was hoped that, through sharing American know-how, atomic energy could be channeled into peaceful uses and weapons stockpiles could be reduced. U.S. AEC Chairman Lewis L. Strauss relaxed security regulations while the President announced that, from then on, primary responsibility for information exchanges would rest with the executive branch and its scientific advisors. Congress was no longer to be asked for approval of the release of specific information.[1]

American interest in Japan's atomic energy program was likewise spurred by the French defeat in Indochina and the subsequent disillusionment that followed in the wake of the Geneva Conference. In the zero-sum cold war thinking which prevailed at the time, America's loss could only mean Russia's gain, and _vice versa_. As U.S. AEC Commissioner Thomas E. Murray stated at the time, the United States' atomic energy aid program would help "nullify what has been lost at Dienbienphu and Geneva."[2] The motivations behind the American offer, then, were a mixture of scientific altruism and political expediency. Spokesmen both in the executive branch and in Congress also expressed anxiety over the prospect of Soviet assistance to emergent nuclear powers. The Japanese were interested in obtaining information from whatever source, and Fujioka Yoshio, Chairman of the Japan Science Council's Atomic Energy Committee, did, in fact, confer with Soviet scientists in Moscow in June, 1955.[3]

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[1] _New York Times_, Nov. 5, 1953, p. 1: 4; and Dec. 17, 1953, p. 1: 6.

[2] _New York Times_, Sep. 22, 1954, p. 14: 5.

[3] _New York Times_, June 27, 1955, p. 3: 1.

The exchange program developed quickly. In June, 1954 the JSC invited members of the U.S. AEC to Tokyo for consultations,[1] and President Eisenhower formally made an offer of fissionable materials to the Japanese along with an extensive atomic energy library.[2] In December eleven Japanese experts (including scientists, Diet members, businessmen, and government officials) were selected by the Preparatory Council for the Peaceful Uses of Atomic Energy to take a three-month tour of the United States and eleven other countries. The purpose of the trip was to survey the state of technological development in ongoing atomic energy programs.[3] The group returned to Japan in March, 1955 convinced that atomic power was absolutely essential in light of the coming energy crisis.[4] At the same time, Japanese scientists began arriving in the United States to attend special study programs at Oak Ridge and Argonne Atomic Energy Research Institutes.[5]

While the Japanese were generally enthusiastic over the American offer of technical assistance, misgivings were expressed in certain quarters, especially within the Japan Science Council. Two major issues gave cause for alarm. How many strings would be attached to the American offer? How stringent would be the secrecy imposed upon Japanese atomic energy development as a consequence of accepting information and equipment which the United States still considered militarily sensitive? The Japan Science

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[1] New York Times, Nov. 10, 1954, p. 28:4.

[2] New York Times, Nov. 13, 1954, p. 3:2.

[3] New York Times, Dec. 26, 1954, p. 50:4; and Yanaga, Big Business, op. cit., pp. 182-83.

[4] Yanaga, Big Business, op. cit., pp. 182-83; and Yomiuri Shimbun, Jan. 10, 1955 in DSJP, Jan. 10, 1955, p. 11.

[5] New York Times, Feb. 28, 1955; p. 5:6; and Nihon Keizai, Jan. 18, 1955 in DSJP, Jan. 18, 1955, p. 10.

Council had adopted its "three principles" of democracy, autonomy, and openness (minshu, jishu, kōkai) at its general meeting in 1954, and it feared that the atomic power enthusiasts in government and industry would be too willing to sacrifice those principles for immediate technological gains.

The U.S. AEC uranium offer had been made under three conditions: secrecy, peaceful use, and restricted dissemination within Japan only. To some, the American conditions were in direct conflict with the JSC's three principles. They opposed sending Japanese science students to study in the United States for fear this would infuse a pro-American bias in future research and development. Some physicists and economists urged decisionmakers not to sacrifice development of Japan's autonomous capabilities in atomic energy by relying too heavily on impressive American reactor technology. Drs. Kaya and Fujioka were leading skeptics in the JSC at this time. Fujioka was Chairman of the JSC Atomic Energy Affairs Committee, and when the Committee agreed to accept the American uranium offer in April, 1955 he opposed the decision openly.[1]

The opponents were in a definite minority, however. The business community was solidly behind American proposals to encourage atomic energy development in Japan. The press also took a favorable stand. <u>Yomiuri Shimbun</u> urged Japan to learn from the West and lectured that "self-sufficiency is a matter of degree."[2] <u>Mainichi Shimbun</u> called for "practical discussions discussions."[3] The <u>Nihon Keizai</u> likened the opponents of Japan-American

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[1]<u>Mainichi Shimbun</u>, Apr. 15, 1955 in <u>DSJP</u>, Apr. 15, 1955, p. 4; <u>Tokyo Shimbun</u>, Feb. 7, 1955 in <u>DSJP</u>, Feb. 8, 1955, p. 3; and <u>Mainichi Shimbun</u>, Apr. 17, 1955 in <u>DSJP</u>, Apr. 18, p. 14.

[2]<u>Yomiuri Shimbun</u>, Apr. 18, 1955 in <u>DSJP</u>, Apr. 18, 1955, p. 5.

[3]<u>Mainichi Shimbun</u>, Apr. 18, 1955, in <u>DSJP</u>, Apr. 18, 1955, p. 4.

cooperation to the opponents of railroad construction in Tokugawa times.[1] The majority of the Science Council itself were favorably disposed. As Morito Tatsuo, President of Hiroshima University said, "(T)he public would regard us scientists as blocking the progress of atomic energy, if we stick too much to the Three Principles."[2] Even Professor Fujioka relented to a considerable degree from his initial opposition. In response to questioning by Nakasone Yasuhiro at a meeting of the House of Representatives Budget Committee on May 19, he came out in favor of accepting the American offer and said, "I think such political strings that are known at present are not objectionable." He did, however, indicate his preference for future assistance to be funneled through the United Nations.[3]

On May 23 the government decided to accept the American uranium offer[4] and began negotiations with American representatives on June 2.[5] Just as the talks got underway, word leaked out that Japan was to be bound by a provision similar to Article IX of the U.S.-Turkey atomic energy assistance treaty which seemed to concede in advance broad proprietary rights to the United States on power reactors to be built in the future.[6] The chief of the Foreign Office's International Cooperation Bureau immediately issued an assurance that the government would ask the United States to delete this provision. Also, Japan would ask that the term of the treaty be reduced from ten to five years to allay misgivings on long range ties between the

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[1] Nihon Keizai, May 10, 1955 in DSJP, May 11, 1955, p. 13.

[2] Mainichi Shimbun, Apr. 17, 1955 in DSJP, Apr. 18, 1955, p. 14.

[3] Yomiuri Shimbun, May 20, 1955 in DSJP, May 20, 1955, p. 11.

[4] Sangyo Keizai, May 23, 1955 in DSJP, May 23, 1955, p. 10.

[5] Mainichi Shimbun, June 2, 1955 in DSJP, June 4, 1955, p. 5.

[6] Asahi Shimbun, May 31, 1955 in DSJP, May 31, 1955, p. 4.

two countries.[1] When a note was attached to the treaty expressing the "hope" that both parties would "consider more cooperation toward atomic power generation in Japan in the future" and providing for "discussions at any time" on a cooperative agreement, opponents viewed this as a subterfuge to keep an American foot in the door.[2] Government leaders in the Diet reassured their colleagues that the Treaty contained no violation of the "three principles," and the Socialist minority could do little but suggest that the signing be delayed until after the Geneva Conference on Peaceful Uses of Atomic Energy had met in August.[3]

The United States made certain small concessions to dispel criticism within Japan. American negotiators agreed to delete the objectionable provision requiring Japan to seek technological assistance from the United States when constructing power reactors.[4] A five year limit was placed on the agreement, and Diet approval was specified. Additionally, certain wording which the Japanese found objectionable from the standpoint of national prestige was softened or deleted.[5] The agreement was signed in Washington on November 14, 1955 and entered into force on December 27 the same year.

This five year treaty covered exchange of information on "research reactors" only and did not extend to "power reactors, power demonstration reactors, or reactors designed primarily for the production of special

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[1] <u>Yomiuri Shimbun</u>, June 1, 1955 in <u>DSJP</u>, June 1, 1955, pp. 8-9.

[2] See Professor Taoka Ryoichi's comments in the <u>Asahi Shimbun</u>, June 28, 1955 in <u>DSJP</u>, June 28, 1955, p. 3.

[3] <u>Asahi Shimbun</u>, June 6, 1955 in <u>DSJP</u>, June 6, 1955, p. 6; and <u>Yomiuri Shimbun</u>, June 2, 1955 in <u>DSJP</u>, June 2, 1955, p. 8.

[4] <u>Mainichi Shimbun</u>, June 2, 1955 in <u>DSJP</u>, June 2, 1955, p. 6.

[5] <u>Yomiuri Shimbun</u>, June 16, 1955 in <u>DSJP</u>, June 16, 1955, pp. 2-3.

nuclear materials." The agreement was strictly limited to "general research and development . . . , medical therapy, or training in nuclear science and engineering."[1] Under its provisions, Japan was free to lease enriched uranium and required to maintain records of "power levels of operation and burn-up of reactor fuels," "make annual reports" to the U.S. AEC, and permit American inspectors to verify proper use of materials and reactors.[2] The U.S. AEC approved the first commercial export of a research reactor for JAERI on November 2, 1956.[3] This was followed up by two lease agreements for enriched uranium, one later the same month and another the following May.[4]

American enthusiasm for Japanese nuclear undertakings was matched by more circumscribed optimism on the part of the Japanese. When John Hopkins, Chairman of General Dynamics Corporation (a major American contractor of reactors and associated equipment) proposed that Japan act as a technological "core" for Asian development and summoned forth the image of an Asian "atomic energy community," Keidanren President Ishikawa suggested that the Japan-U.S. partnership tackle "more simple" things for the time being.[5]

This caution was well founded as there existed basic disagreement within the scientific and political communities in Japan on the correct path to take. JAEC Chairman Shoriki spoke out for agreements with the

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[1] U.S., Department of State, United States Treaties and Other International Agreements. "Atomic Energy: Cooperation for Civil Uses," TIAS No. 3465, Nov. 14, 1955, p. 3.

[2] Ibid.

[3] Embassy of Japan, Japan Report, II (November 15, 1956), p. 8.

[4] Embassy of Japan, Japan Report, III (May 25, 1957), p. 7.

[5] New York Times, May 19, 1955, p. 43:1.

United States which would permit Japan to develop nuclear power generating plants immediately. In January, 1956 he indicated that the JAEC "had agreed to recognize the necessity of conducting an atomic power agreement with the U.S. as early as possible with an eye to promoting the practical use of atomic energy.[1] The other members of the Commission[2] disagreed that the JAEC had made any such decision, and they opposed such hasty development on the grounds that it would violate the Basic Atomic Energy Law just passed in December, 1955. Shoriki retracted his statement the following day, explaining that it was simply his own "private plan."[3]

Chairman Shoriki likewise came into conflict over his encouragement of private "speculative development" of nuclear energy. The leftist political sympathies of many scientists encouraged them to speak out against dominance by American firms which were already negotiating contracts with Japanese manufacturers. They called for broader government control of the industry generally.[4]

The United States continued to encourage the development of peaceful atomic energy projects in Japan by offering to provide enriched uranium in small amounts for research. In June, 1956 the Joint Atomic Energy Committee approved export of up to one hundred grams of enriched U-235 and ten grams of plutonium to countries desiring these materials.[5] Also, by executive order, the prices of American atomic fuel were cut, and accountability

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[1] Mainichi Shimbun, Jan. 6, 1956 in DSJP, Jan. 6, 1956, p. 5.

[2] Arisawa Hiromi, Fujioka Yoshio, Ishikawa Ichiro, and Yukawa Hideki.

[3] Yomiuri Shimbun, Jan. 7, 1956 in DSJP, Jan. 7, 1956, p. 15.

[4] New York Times, Jan. 8, 1956, p. 21:1.

[5] Asahi Shimbun, June 7, 1956 in DSJP, June 8, 1956, p. 6.

requirements for research materials relaxed.[1] JAEC Commissioner Arisawa warned that Japan could become completely dependent on the United States if she developed enriched fuel reactors, and urged that natural uranium reactors be considered instead.[2] Fushimi Koji, Chairman of the JSC Atomic Energy Project Committee, also foresaw the possibility that the United States might succeed in shutting out all competition in the enriched fuel field.[3] Nevertheless, the government signed an agreement with the United States for the lease of enriched uranium in November, 1956.[4]

Despite the objections of the Elementary Particle Theory Group in the Japan Sciemce Council and opposition politicians over financing arrangements and safety questions, the nuclear energy program gained sufficient momentum to require, in 1958, a revised agreement with the United States. Of particular concern was the increased need for enriched uranium required by several new advanced research projects underway at the time, including an experimental fast breeder reactor. On June 16, 1958 a ten-year treaty, superseding the 1955 agreement, was signed and went into force in December. Unlike the earlier treaty, the 1958 version provided for American assistance for power generating reactors as well as research machines. It also authorized the United States to sell, as well as lease, certain fissionable materials.

Japanese scientists had originally proposed a most ambitious development plan which would have entailed American support for some one dozen reactors of various types (including three power reactors) plus two

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[1] _Yomiuri Shimbun_, Nov. 19, 1956 in _DSJP_, Nov. 19, 1956, p. 16.

[2] _Sankei Shimbun_, Feb. 23, 1956 in _DSJP_, Feb. 24, 1956, p. 9.

[3] _Mainichi Shimbun_, Feb. 23, 1956 in _DSJP_, Feb. 24, 1956, p. 12.

[4] _Sankei Shimbun_, Nov. 25, 1956 in _DSJP_, Nov. 26, 1956, p. 1.

nuclear tankers. They had asked for 7,000 kilograms of enriched uranium over the ten year life of the treaty. This program was held to be "unrealistic" by the U.S. AEC, and after cutting back to one power reactor and eliminating the ships, agreement on 2,700 kilograms for currently "defined reactor projects" was reached. Although private users of fissionable materials had been pressing the Japanese government to purchase uranium, American law restricted ownership to the government only. The treaty did authorize the leasing of uranium to private users in Japan, provided the Japanese government retained title to such materials at least until private American users were permitted by U.S. law to purchase them from the government.[1]

By a protocol signed in October, 1958, authorization for enriched uranium was increased from six to eight kilograms per reactor, and for plutonium from ten grams to two hundred sixty grams. The protocol likewise stipulated that any plutonium in spent fuel which the United States happened to repurchase from Japan would be used "for peaceful purposes only."[2] This latter item was the cause of considerable debate in Japan. The United States evidently preferred that any such guarantee be in the form of a secret memorandum which would not be released even to the Congress.[3] President Eisenhower had indicated in November, 1955 that plutonium returned to the United States would not be used in weapons production. However, Congress was at this time discussing the purchase of more plutonium from

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[1] U.S., Department of State, United States Treaties and Other International Agreements. "Atomic Energy: Cooperation for Civil Uses," TIAS No. 4133, June 16, 1958, pp. 1-3.

[2] Atoms in Japan, II (No. 10, 1958), 13.

[3] Tokyo Shimbun, June 17, 1958 in DSJP, June 17, 1958, pp. 5-6.

abroad to build up its stockpiles,[1] and the U.S. AEC was seeking to have the Atomic Energy Act revised to permit the use of returned plutonium without restriction for fifteen years.[2] In view of these considerations, the Japanese insisted that the restriction on the use of returned plutonium be included in the 1958 memorandum.

As the Japanese atomic energy program continued to grow, American assistance was broadened to keep pace with it. An agreement signed on August 7, 1963 (in force April 21, 1964) amended the 1958 treaty by eliminating the upper limit on fissionable materials for research purposes although it did not extend to "fueling reactors" or to "reactor experiments."[3] Finally, in February, 1968 a thirty-year cooperative agreement was signed (in force July 10, 1968) which replaced the treaty of ten years previous. This provided that the United States would supply all expected enriched uranium needs, up to 161,000 kilograms, for power reactors over the term of the treaty. In addition, 365 kilograms of plutonium was to be supplied for the Japanese program.[4] In line with the 1964 decision by the U.S. AEC to allow American private industry to buy and sell uranium, plutonium, and other nuclear materials, the 1968 treaty provided for possession by private users in Japan. The Japanese government was still held legally responsible

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[1] Tokyo Times, June 6, 1958 in DSJP, June 6, 1958, p. 2.

[2] Tokyo Shimbun, June 17, 1958 in DSJP, June 17, 1958, p. 6.

[3] U.S., Department of State, United States Treaties and Other International Agreements. "Atomic Energy: Cooperation for Civil Uses," TIAS No. 5553, Aug. 7, 1963, p. 1.

[4] The power reactor program, as outlined in an appendix to the treaty, included three reactors already under construction, nine more planned for the 1968-1971 period, plus an additional reactor under consideration for 1970-1972.

for controlling circulation and disposition of fissionable materials.[1]

As in the case of earlier agreements signed with the United States, there was concern among many knowledgeable Japanese lest the atomic energy program become too dependent on the United States. The thirty-year term of the treaty was considered too long, and the uranium supply too inflexible to allow full potential for a growing research and development program.[2] The Mainichi Shimbun blamed the pro-American electric power companies for slighting the need for an independent fuel supply and concluded that "(P)rimary consideration should be given to 'national interests.'"[3] Asahi, on the other hand, while concerned about dependency on the United States, saw Japan's first priority as the production of electricity which depended on a supply of low cost fuel. Consequently, that paper felt the 1968 agreement was worth the cost.[4]

Notwithstanding arguments pro and con in Japan, it is doubtful that Japan will continue to be so totally reliant on the United States for its fuel supply for much longer. American uranium reserves are being outstripped by world demand, and the U.S. AEC announced in 1971 that it would begin restricting its sales to foreign nations in 1973.[5] Assuming the close economic ties between Japan and other advanced industrial areas like the United States and the expanded Common Market countries remain firm, Japan can be expected to seek cooperative arrangements that will reflect its increas-

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[1] U.S., Department of State, United States Treaties and Other International Agreements. "Atomic Energy: Cooperation for Civil Uses, TIAS No. 6517, Feb. 26, 1968, p. 1.

[2] Atoms in Japan, XII (May, 1968), 26.

[3] Mainichi Shimbun, Feb. 19, 1968 in DSJP, Feb. 19, 1968, pp. 31-33.

[4] Asahi Shimbun, Feb. 17, 1968 in DSJP, Feb. 21, 1968, pp. 3-4.

[5] Nihon Kogyo, Mar. 18, 1971 in DSJP, Mar. 19, 1971, pp. 7-8.

ingly sophisticated atomic technology base. As the Japanese need for atomic power becomes more and more critical, and as her technological expertise and investment capital become ever more in demand, the donor-recipient relationship that has, until recently, so characterized the American-Japanese atomic energy relationship will quickly fade.

Great Britain

Besides the United States, Japan has also developed a close relationship with Great Britain. Japan's decision to import her first power reactor from Britain was confirmed in an agreement signed on June 16, 1958, the same day as the revised agreement with the United States. As was the case in the American agreements, there was limited but highly vocal opposition to accepting partnership with the British. Inspection was one troublesome point, and the Japanese resented having their entire reactor operations inspected by the British who were supplying only a part of the equipment used therein. Disposition of the plutonium contained in the spent reactor fuel was another problem. Japanese planners preferred to reprocess their own irradiated fuel for the benefits this would provide the domestic plutonium research program. The problem of maintaining secrecy over the technology imported from the British was likewise considered inconsistent with the "three principles" embodied in Japan's Basic Law.[1]

However, the most significant opposition to the exchange agreement with the British revolved around the so-called "hold harmless" clause. The "hold harmless" provision absolved the British government from any responsibility in the "processing, possession, leasing and utilization of the nuclear

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[1] Atoms in Japan, I (No. 5, 1957), 1-2; and Shoichi Sakata, "My Apprehensions About the Atomic Energy Agreements," Sekai (August, 1958) in SSJM, July 28, 1958, pp. 14-16.

fuels supplied" that took place in Japan after delivery.[1] In effect, this released Great Britain, as supplier, from any responsibility for defective fuel once the Japanese had taken possession. This seemingly minor dispute over wording contained the seeds of two fundamental political issues which were at the heart of the atomic power debate.

Public safety The "hold harmless" clause first raised the question of safety. The British desire to be released from any liability resulting from the use of their own fuel elements did not inspire confidence in the Japanese, particularly as the whole discussion occurred in the wake of the Windscale incident in Great Britain.[2] When the British government announced its intention to use the Calder-Hall (C-H) for plutonium production as well as for power generation, opponents of the agreement suspected that this indicated that the British themselves had doubts about the C-H reactor which was to have formed the mainstay of Britain's atomic power generation.[3]

The safety question had been aired at length for some time in Japan, and reached a head at a public hearing in Tokyo in July, 1959. The primary point at issue was the ability of the Calder-Hall to withstand earthquakes. The internal construction of the C-H reactor consisted of natural uranium fuel rods inserted through some 3,000 vertical holes in 70,000 graphite bricks which acted as the atomic reaction moderator. These physical

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[1] Atoms in Japan, II (No. 1, 1958), 5.

[2] In 1957 the cooling system of a natural uranium reactor pile at Windscale had failed. A serious incident was avoided by emergency procedures, but the reactor was ruined in the process. The escaped radioactivity caused minor damage in the surrounding countryside, but caused widespread public concern in Britain and northern Europe. For a fuller account of the incident see Sheldon Novick, The Careless Atom (New York: Dell Publishing Company, 1969), pp. 5-10.

[3] Mainichi Shimbun, June 20, 1958 in DSJP, June 20, 1958, p. 12; and Sankei Shimbun, July 7, 1958 in DSJP, July 7, 1958, p. 2.

properties seemed especially prone to earthquake jarring and disalignment.[1] The JAEC had previously vouched for the earthquake-proof design of the reactors slated for importation, and had assured the skeptical that they could resist seismic forces one and a half times those specified in the Japanese building code. The cooling system was guaranteed to stand up to three times the normal stress requirements.[2]

The Elementary Particle Theory Group in the Japan Science Council challenged these findings, but the Japan Atomic Industrial Forum dismissed their criticisms as politically motivated.[3] According to Professor Fushimi of Osaka University, expert opinion was divided.[4] Professor Sakata Shoichi of Nagoya University was one of those in the JSC who remained skeptical. The safety of the Calder-Hall, he insisted, "remains to be proved." Later, Sakata, who served on the JAEC Atomic Reactor Safety Investigation Subcommittee, resigned rather than approve the Calder-Hall.[5]

The earthquake issue, as well as two other safety questions, was addressed at the Tokyo hearing by atomic power proponents. There was no danger of earthquake damage, JAPCO replied, since the graphite moderating blocks would be held in place with clamps and a steel container capable of withstanding tremors twice the force of the devastating 1926 Kanto earthquake. Charges that the Calder-Hall was prone to "run-away" when operating

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[1] Asahi Shimbun, July 30, 1959 in DSJP, July 31, 1959, p. 15.

[2] Atoms in Japan, I (June, 1957), 9-10; and Asahi Shimbun, Apr. 24, 1958 in DSJP, Apr. 24, 1958, p. 6.

[3] Asahi Shimbun, Mar. 20, 1958 in DSJP, Mar. 20, 1958, p. 10.

[4] Tokyo Shimbun, June 16, 1958 in DSJP, June 17, 1958, p. 7.

[5] Mainichi Shimbun, Aug. 23, 1959 in DSJP, Aug. 25, 1959, p. 5; and Tokyo Shimbun, Nov. 13, 1959 in DSJP, Nov. 13, 1959, p. 1.

temperatures reached a certain level[1] were put down with official assurances that automatic control devices would handle any such unexpected phenomenon. On a third point, JAPCO and the Meterological Agency denied, on the basis of air current tests, that there was any "inversion-stratum" above Tokai-mura, the site of Japan's major atomic complex, which would trap radioactive exhaust gases to be precipitated on populated areas.[2]

Scientific questions had been raised and answered. Still, there was no agreement among the experts, and little likelihood that any would be reached, since the Calder-Hall was, at this point, still a new and relatively unproven piece of machinery.[3] From the standpoint of public safety, there were still gaping holes in the government's bland assurances.

Ohtsuka Masuhiko of the JSC Special Committee on Nuclear Energy pointed out that the JAEC had neglected to define standards of "safety," and so to say the Calder-Hall was safe or unsafe was without real meaning. Shionoya Noboru, an official of Sohyo, which opposed the reactor project, questioned the objectivity of the JAEC's safety examinations since one of the agency's primary duties was to promote atomic energy development. Iwagami Jiro, Governor of Ibaraki Prefecture where Tokai-mura is located, argued for the relevance of public confidence. Much more effort was needed, he felt, in publicizing the questions argued by the small group of insiders at the Tokyo hearings, while special attention should be given to assuaging public apprehensions about atomic energy.[4]

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[1]See Novick, The Careless Atom, op. cit., pp. 6-7 for an explanation of this "Wigner energy" effect.

[2]Asahi Shimbun, July 30, 1959 in DSJP, July 31, 1959, p. 15.

[3]See the Sankei Shimbun's comments on this point, Aug. 3, 1959 in DSJP, Aug. 1-3, 1959, p. 4.

[4]Atoms in Japan, III (August, 1959), 7-15.

Perhaps the most poignant statement was that of Nemoto Tokinosuke, headman of Tokai-mura, the village at the vertex of the atomic dispute. Nemoto had expressed doubts about JAPCO's tentative selection of the Tokai-mura site for the reactor even before surveys had been taken.[1] After the Tokyo hearings, he expressed his frustrations at what had transpired.

> I myself, being a layman, cannot decide whether the proposed reactor is after all safe or not, and we have only to rely on opinions of scholars. I hope they will make careful and scientific examinations so as to arrive at an unanimous conclusion.[2]

The Calder-Hall safety hearings can hardly stand as a model of public debate to be emulated. The differences of views were described as "emotional" by one observer,[3] and the full ramifications of the government's decision did not receive a full airing. The limpness of the JAEC's case was suggested as due in large part to Chairman Miki's political preoccupations with the Liberal Democratic Party's internal infighting at the time.[4] The safety issue came into prominence at a time when Prime Minister Kishi's prestige was at a low ebb and a cabinet reshuffling imminent. More serious than this, was the Japan Science Council's failure to confirm itself as a forceful and self-reliant impartial spokesman for the scientific community and the public. Fukushima Yoichi, a JSC member who supported the decision to proceed with the Calder-Hall, nevertheless criticized the JAEC for its inattention to opinions of the JSC and other academic bodies. He regretted the JAEC's tendency to mistake questioning for opposition, *per se*.[5] In this

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[1] *Atoms in Japan*, II, (No. 7, 1958), 17.

[2] *Atoms in Japan*, III, (August, 1959), 19.

[3] *Tokyo Shimbun*, Jan. 10, 1959 in *DSJP*, Jan. 10-12, 1959, p. 15.

[4] *Ibid.*

[5] *Asahi Shimbun*, Dec. 11, 1959 in *DSJP*, Dec. 11, 1959, p. 17.

major test at the ten year point in its history, the JSC appears to have had little influence as a policymaking force in Japanese politics.

Government indemnification The "hold harmless" clause also raised the explosive political question of government indemnification of private businessmen engaged in atomic power generation. Since the agreement absolved the British suppliers for responsibility from any accidents associated with the use of nuclear fuel, insurance on atomic power operations would have to be handled domestically. Japanese business circles complained that sufficient coverage would be economically prohibitive for private firms. It was clear that the government would have to assume a share of the responsibility as the American government had done under the Price-Anderson Act. But to what extent was the government to be responsible for insuring private business ventures? The Socialists, who had been calling for a nationalized atomic energy program from the beginning, objected strenuously to state subsidization of capitalism. Within the government, there was also pressure (especially from the MOF) for the government to keep its fiscal responsibility to a minimum if it was to have no actual control.[1]

Besides the debate over safety and government indemnification, a number of physicists, including the famous Professor Yukawa, were opposing the signing of an agreement on the Calder-Hall at least until after the Second Geneva Conference on the Peaceful Uses of Atomic Energy scheduled for the coming September. It was suggested that new evidence of recent scientific and technological developments might warrant revision of the agreement.[2] Despite the protests, the agreement for exchange of information

[1] Atoms in Japan, II (No. 3, 1958), 1-2; and Atoms in Japan, II (No. 5, 1958), 3-6.

[2] Atoms in Japan, I, (No. 5, 1957), 27.

and a commitment for the purchase of reactors and fuel was signed in June.[1]

At the Geneva Conference in September doubts about the safety and operating efficiency of the Calder-Hall were shown to have been not entirely groundless,[2] and the Japanese discovered that neither the United States nor Great Britain was as technologically advanced in the field of practical reactor production as many had believed. In the long run, this perhaps inspired Japanese planners and researchers to push ahead on their own with more confidence in their own abilities.[3] In the short run, it meant that more hard bargaining was needed before the Japanese would accept the British reactor.

The chief Japanese negotiator, JAPCO President Yasukawa, announced that he had obtained the Prime Minister's permission to break off the negotiations "if and when the Japanese side cannot be convinced as to the safety and economy of the generation reactor."[4] The Calder-Hall was accepted as Japan's first commercial power reactor,[5] but not until after U.K. AEA Director Dr. John Cockcroft made a trip to Tokyo in November to assure the Japanese on the safety and performance of the British machinery.[6]

All in all, this first experience with importing commercial atomic

[1] Embassy of Japan, Japan Report, IV (July 14, 1958), 7.

[2] Sankei Shimbun, Sep. 22, 1958 in DSJP, Sep. 22, 1958, p. 1.

[3] Seiki Watanabe, "Atoms-for-Peace Conference and Japan's Future Atomic Policy," Sekai (November, 1958), in SSJM, Oct. 27, 1958, pp. 20-21.

[4] Asahi Shimbun, Oct. 11, 1958 in DSJP, Oct. 11, 1958, p. 15.

[5] JAPCO finally decided on General Electric (U.K.) as the Calder-Hall reactor contractor in February, 1959. Fuji Electric of the FAIG consortium was selected as the local Japanese subcontractor. See Mainichi Shimbun, Feb. 27, 1959 in DSJP, Feb. 27, 1959, p. 1; and Tokyo Shimbun, Mar. 3, 1959 in DSJP, Mar. 4, 1959, p. 13 and Oct. 15, 1959 in DSJP, Oct. 15, 1959, p. 13.

[6] Tokyo Shimbun, Nov. 25, 1958 in DSJP, Nov. 26, 1958, p. 12.

reactors must have opened many Japanese eyes to the inconvenience of relying upon foreign governments in an area with such vital economic significance and widespread political implications. At the least, it cannot have weakened their resolve to pursue the long range goal of autonomous domestic reactor development.

As in the American case, this ten-year treaty was followed up by a thirty-year agreement on peaceful uses in 1968 but without the ceilings on fissionable materials to be supplied as provided for in the U.S.-Japan arrangement.[1] The same year the British signed a contract to reprocess one hundred sixty tons of spent fuel over the following four years. This was to help fulfill reprocessing needs until a projected domestic reprocessing facility at Tokai-mura was completed. At the time of the signing the Tokai project was still bogged down over problems of the construction site, design contracts, and a request for an interest-free loan which was being opposed by the Finance Ministry.[2] The 1968 British-Japanese agreement, like the one with the United States, provided for periodic meetings between the JAEC and its British counterpart to help ensure continuing contact on matters of mutual interest.

The British and Japanese have also been exchanging information on fast breeder reactor development since December, 1965.[3] The most recent agreement between the PNC and the U.K. AEA is the MOZART project.[4] Great Britain is expected to begin construction of its first commercial fast breeder in 1974, about the same time that Japan starts on its FBR prototype.

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[1] _Atoms in Japan_, XII, (February, 1968), 9.

[2] _Atoms in Japan_, XII (April, 1968), 6-9.

[3] _Atoms in Japan_, IX (December, 1965), 16.

[4] Monju-Zebra Assembly Reactor Trial

MOZART provides for equal division of the plutonium accumulated in the course of the program.[1]

Other Cross-National Linkages

Besides the close working relationships with the United States and Great Britain, Japan has sought to strengthen ties with Canada, France and Germany as well as other European atomic energy agencies, and the International Atomic Energy Agency. She has also engaged in a modest atomic technology export program herself.

Canada General cooperation and information exchange agreements have been signed with Canada. The Japanese were especially hopeful that uranium supply sources could be guaranteed by the Canadians so as to lessen dependency on the United States.[2]

West Germany Since 1959 Japan and West Germany have been exchanging information on the peaceful uses of atomic energy. Contacts between the two countries reached the foreign minister level in 1967 when Miki Takeo and Willy Brandt discussed their respective strategies on the Nonproliferation Treaty. While both men denied any military-related developments, both expressed a firm resolve to retain all rights to peaceful uses of the atom. The two foreign ministers agreed to continuing exchanges of information, but did not go so far as to proclaim any "common front."[3] Exchanges of information and joint atomic energy research programs were broadened in 1969

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[1] Atoms in Japan, XV (July, 1971), 25.

[2] Atoms in Japan, IV (July, 1960), 8-9; and XI (December, 1967), 27.

[3] "Chronology," Japan Quarterly, XIV (July-September, 1967), 397.

to include exchange of industrial techniques,[1] and in May, 1971 a basic research contract on the FBR was signed between the two countries. Japan has also been keeping abreast of fast breeder technology in the Netherlands and Belgium.[2]

France Contact with French nuclear scientists was slower in coming, but the Japanese were determined to use their contacts with France to help break out of what they considered to be the junior-partner role foisted upon them by the United States and Great Britain. Consequently, they approached their dealings with France with an eye to "perfect mutualism."[3]

The first Franco-Japanese Conference on Nuclear Technology was not held until 1962. This was followed two years later by another meeting out of which grew a broad exchange program involving scientists, materials, and information. Bilateral efforts in radiation chemistry have been especially fruitful.[4] In 1967 a one-year experimental project was launched to develop a high plasma generator to be used in future nuclear fusion reactors.[5] The two countries signed an FBR development agreement in December, 1968,[6] and they have found themselves on common ground in the desire for developing gaseous diffusion enrichment plants.[7] In March, 1972 a ten-year agreement

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[1] Nihon Keizai, Nov. 12, 1969 in DSJP, Nov. 13, 1969, p. 4.

[2] Atoms in Japan, XV (July, 1971), 25.

[3] Atoms in Japan, VIII (April, 1964), 1-2; and Nihon Keizai, Oct. 5, 1970 in DSJP, Oct. 6, 1970, p. 40.

[4] Atoms in Japan, IX (February, 1965), 13-16; and Atoms in Japan, IX (August, 1965), 18-19.

[5] Atoms in Japan, XI (July, 1967), 39.

[6] Atoms in Japan, XIII (January, 1969), 8.

[7] Nihon Keizai, Mar. 18, 1971 in DSJP, Mar. 20, 1971, p. 14.

on fuel supply and information exchange was signed.[1]

International Atomic Energy Agency In addition to her bilateral contacts, Japan has been active in multilateral atomic energy agreements through the International Atomic Energy Agency. Japan has enthusiastically supported the movement toward international cooperation in atomic energy development, and in October, 1956 decided to join the Agency as soon as it came into being. Japanese representatives served on the IAEA Preparatory Committee and have been on the Board of Governors since the Agency was organized on July 20, 1957.

Japan was the first nation, in 1958, to request nuclear material through the IAEA for its research reactors. At the same time, Japan asked the IAEA for guidelines for setting up its nuclear material safety, accounting, measurement, and storage systems.[2] In 1963, Japan volunteered to place its atomic energy exchange program with the United States under Agency inspection,[3] and it has followed suit since that time with all other international exchanges of nuclear materials. The Ninth Regular Session of the IAEA General Conference was held in 1965 in Tokyo. This was the first time that an IAEA conference was held outside of Vienna.

OECD and the ENEA In line with its encouragement of international cooperation in the peaceful uses of atomic energy, Japan has sought to

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[1] Japan Times Weekly, Mar. 4, 1972, p. 2.

[2] "Evaluation of IAEA Safeguards," International Atomic Energy Agency Bulletin, VII (June, 1965), 4.

[3] U.S., Department of State, United States Treaties and Other International Agreements. "Atomic Energy: Application of Safeguards by the IAEA to the United States-Japan Cooperation Agreement," TIAS No. 5429, 1964.

establish contact with other multilateral organizations as well to ensure a continuing flow of information on technological advances and to avoid being isolated from the mainstream of atomic energy development. STA representatives began attending meetings of science ministers of the Organization for Economic Organization and Development (OECD) countries in 1963.[1] In April, 1964 Japan became an associate member of the European Nuclear Energy Agency (ENEA)[2] and registered as full member in 1967. By fiscal year 1972 Japan was scheduled to be participating fully in all ENEA organizations.[3] At the same time, Nakasone Yasuhiro and others have been advocating even broader cooperation between Japan and the other countries with advanced atomic energy programs around the Pacific basin.

Japanese atomic aid program International assistance has not been entirely one way. In cooperation with the IAEA, Japan has hosted a number of exchange programs in atomic energy research and training. As early as 1955 the "atomic energy group" in the Diet[4] proposed an Asia Atomic Center be built in Tokyo to dispense the benefits of the atom throughout the continent.[5] The Socialist Party has been most vigorous in pressing for an Asian counterpart of Euratom. In 1960 Oka Ryoichi, a JSP member of the House of Representatives, discussed the idea of Asiatom with atomic energy representatives in Egypt and India and with IAEA Secretary-General Sterling Cole. All parties were said to have shown interest in the proposal, although

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[1] Tokyo Shimbun, Oct. 9, 1963 in DSJP, Oct. 12, 1963, p. 9.

[2] Atoms in Japan, IX (February, 1965), 22.

[3] Atoms in Japan, XV (September, 1971), 35.

[4] This very "pro" group of Diet members was headed by Nakasone Yasuhiro (LDP), Tomabechi Gizo (LDP), and MIWA Juso (JSP).

[5] Tokyo Shimbun, Dec. 20, 1955 in DSJP, Dec. 21, 1955, p. 17.

successive governments in Tokyo since that time have not pushed for any such expanded Japanese role.[1]

Up to the present time, multilateral assistance has been extended by Japan through IAEA and United Nations auspices. In 1958 a radioisotope school was established within JAERI on request from UNESCO. The training course attracted students and visiting professors from throughout Asia, Latin America, and Eastern Europe. As of June, 1967, 185 trainees had completed the course.[2] Japan frequently serves as host for conferences on the peaceful uses of atomic energy, especially for regional Asian and Pacific countries. In 1965 Japan began to sponsor research programs involving irradiation of agricultural products to reduce disease and increase crop yields.[3] The joint venture has had considerable success in expanding the production of rice and other staple grains in Southeast Asia.

International linkage patterns

The pattern of international linkages formed by exchanges of atomic technology has been undergoing steady change. Japan has progressed from a state of dependency on American largess to a position as one of the world's leading contributors to atomic research and development. While the international flow of technology has been mostly inward, the time has come when Japan can begin to export the results of her experience in reactor development and other civilian uses of the atom.

As Japan's atomic technology has become more sophisticated, her

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[1] Ryoichi Oka, "I Advocate Establishment of ASIATOM," in Seikai Orai (June, 1960), in SSJM, June 13, 1960, pp. 10-11.

[2] Atoms in Japan, XI (July, 1967), 5-9.

[3] "Gift Capsules from Japan," International Atomic Energy Agency Bulletin, VII (March, 1965), 52; and "Japan and Atomic Cooperation," International Atomic Energy Agency Bulletin, VII (September, 1965), 15.

international linkages have been expanded. The industrial economy of Japan will become increasingly dependent on atomic technology for the rest of this century, and the Japanese are searching for more and better methods with a greater variety of international partners to ensure the security of her access to this vital resource. This may mean that Japanese-American ties will become relatively less important, but it is unlikely that Japan will find any other source of atomic technology anywhere nearly so advanced, accessible, and reliable. This partnership will undoubtedly continue, but on a more equal basis of sharing in peaceful atomic technology. The only major crisis that could threaten this cooperative venture would be for Japan to turn her atomic resources to military uses. This problem is explored in Chapters VIII and IX.

Technology as a Source of Political Demands

The foregoing two chapters have indicated the many and varied political ramifications that ensue from the introduction of technological changes into a society. Such technological change has an impact on the political system of a society in which it takes place in two respects. First, it broadens the scope of political activity by creating new alternatives for policymaking and by creating a need for new political mechanisms to channel societal resources to these chosen ends. It has been shown how the sudden infusion of atomic energy technology into Japan led to a whole series of reactions in the political system. New organizational structures have been established both in the public and private sectors to set goals, establish priorities and allocate resources. Because of the scope of the new research and development programs, the government's role as an economic promoter and regulator has greatly expanded. In the broadest sense, the finite limitations on the productive capacity of Japanese society have been extended in all forms of social goods and services by the impact of atomic technology.

While atomic technology has widened the scope of political action open to Japanese political decisionmakers, it has also led to a sustained increase in the volume of demands that impinge upon the decisionmaking process. Problems associated with establishing secure international flows of essential resources, providing for reliable international technological exchange agreements, centralizing the production of materials with possible military uses, and guaranteeing the safety of reactor operations are all questions which are, in essence, technical, but which have stimulated strong demands for political action from various sources in both the domestic and international levels.

Just as technical factors have led to the articulation of political demands, the political environment in turn structures the channels through which technical questions must be resolved. The tradition of the highly interlocking cooperative relationship between business and government in Japan in 1955 certainly accounts in large part for the way functions and responsibilities were organized in the Japanese atomic energy community at that time. The strong links between the Japanese and American atomic energy programs were not due entirely to the advanced state of American technology, but also reflect the political relationship between the two countries in the mid-1950s. Some Japanese scientists, in fact, encouraged contacts with the Soviet Union. However, in the political atmosphere that prevailed at the time, few linkages were established. Likewise, Japan's recent decisions to broaden its technological and fuel supply contacts can be attributed in part to its search for a more independent political stance and to the determination to base linkages with other countries on a more equal relationship. The international military ramifications of Japan's atomic energy development program will be explored at greater length in Chapter IX.

CHAPTER VI

THE JAPANESE PUBLIC AS A POLITICAL ACTOR

Modern societies, as they grow in size and complexity, are frequently subject to widespread feelings of alienation between citizens and their political institutions. Often such phenomena are attributed to the effects of technology. Technology, it is said, multiplies our creature comforts, but in doing so, makes us less dependent on one another and more dependent on the impersonal forces which serve us. Technology has been said to remove from the grasp of the average man any possibility of understanding, much less any hope of influencing, the physical and social processes which set the boundaries of his existence.

Scientific theories of the atom and their technological applications, are surely among some of the most esoteric bodies of knowledge in existence today. The acute military circumstances surrounding the birth and early development of atomic energy have compounded the almost religious aura in which it is perceived. These barriers between the atom and man were sufficiently high not so long ago as to lead one renowned philosopher to conclude that "(I)t is impossible today or in the foreseeable future to have a frank, rational, searching discussion of the industrial uses of atomic energy."[1]

One cannot predict with any precision, however, just what outcomes, in social and political terms, will result from any given technological

[1] James B. Conant, Modern Science and Modern Man (New York: Columbia University Press, 1952), p. 15.

stimulus. Rather than forestalling rational public discussion, there are those who feel that "(G)iven increased leisure and the sophisticated communications technology now already available, it is possible to conceive of a modern version of the Greek polis, one in which all members of the community could participate in its affairs in ways that would make them truly citizens of the political order."[1]

The effects of the atomic energy development program in Japan have certainly produced no political "golden age." Yet neither have they so intimidated the Japanese public that they have forsworn any attempt to bring influence to bear on the political processes surrounding atomic energy. In fact, it is precisely in the area of environmental pollution, and atomic energy can be considered a special case under this rubric, that citizen groups have recently been most active in making political demands. The concept of direct public participation in political decisionmaking does not fall on particularly fertile ground in Japan. The agora and the town meeting are not part of the Japanese political culture. However, citizen action groups, or what Langdon refers to as associational groups,[2] are acquiring some political influence today.

This chapter will analyze the impact that atomic technology has had on the Japanese public as a political actor. First, efforts by the government and the atomic industry to popularize the atomic reactor program will be examined. Public involvement during the early stages of the development program was for the most part limited to a one-way informational flow. Public participation in an active sense was stimulated by the failure

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[1] Joseph Haberer, "Technology and the Emerging Future: A Framework for Normative Theory," paper delivered at the 1971 Annual Meeting of the American Political Science Association, Chicago, September 7-11, 1971, p. 9.

[2] Frank Langdon, Politics in Japan (Boston: Little, Brown and Co., 1967), pp. 96-102, 185-88.

of the atomic energy establishment to come to conclusive decisions on the question of safety. Three facets of the safety issue will be examined: the problem of siting facilities handling radioactive materials, the debate over an "acceptable" dosage of radioactivity, and the search for an integrated indemnity/insurance program which would balance the interests of the public, the government, and the atomic energy industry. A third section of the chapter will be devoted to the issue of nuclear-propelled vessels in Japanese ports. The question is intimately tied to the Japanese-American defense relationship, but it has another, less well publicized, side which has helped to shape public attitudes on atomic energy. Finally, the public impact on atomic energy policymaking will be weighed on balance, and examined in terms of its possible implications for political decisionmaking in a larger perspective.

Formation of Public Attitudes

When President Eisenhower's Atoms for Peace announcement prompted the decision to proceed with a civilian atomic reactor development program in Japan, the first tangible result of that decision was a full scale public relations campaign. Yomiuri Shimbun President Shoriki Matsutaro, an enthusiastic atomic energy promoter and first JAEC chairman, initiated the program in 1955. When he assumed his duties on the Commission it was taken over by a committee within the Keidanren (Federation of Economic Organizations). Speakers were brought to Japan from the United States to publicize the assistance that would be forthcoming from American government and industry. Keidanren President Ishikawa, in turn, toured American atomic energy facilities that summer. The newly formed Keidanren Committee on the Peaceful Uses of Atomic Energy put the resources of Japanese industry at the service of Japanese government and business figures who were laying the administrative groundwork for the new atomic energy complex, and made significant contributions to the Atomic Energy Basic Law which was enacted by the Diet the following year.[1]

To give wide play to the peaceful atomic energy theme, Yomiuri Shimbun conducted a nation-wide poll at the end of July. The response indicated that 51 per cent of the public already has some positive interest in the issue. When asked what especially "interested" them, most mentioned electric power generation or other industrial applications. Few people had any specific advice as to proper use of the atom, but 20 per cent cautioned that it not be used for military purposes and another 10 per cent urged that care be taken in controlling the new energy source.[2] An Atoms for Peace exhibition held at Hibiya Park in November and December drew 367,000 spectators.[3] Reaction was overwhelmingly favorable, especially among students. The most impressive display appeared to be the model reactor.[4]

The atomic power industry has not neglected its image in the years since. October 26 is celebrated each year as Atom Day. It was on that date in 1956 that Japan signed the IAEA charter, and on that same date in 1963 that the first successful power generation test of the Tokai Power Demonstration Reactor took place. The government and the atomic power industry have engaged in a variety of promotional activities, including lectures, films, group discussions, television and radio presentations, and even cartoon books.[5] In 1969 these efforts were consolidated in the Japan Atomic

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[1]Yanaga, Big Business, op. cit., pp. 185-88.

[2]Yomiuri Shimbun, Aug. 15, 1955 in DSJP, Aug. 16, 1955, p. 11.

[3]Yanaga, Big Business, op. cit., p. 192.

[4]Yomiuri Shimbun, Dec. 2, 1955 in DSJP, Dec. 3, 1955, pp. 17-18.

[5]Atoms in Japan, XIV (November, 1970), 38.

Energy Relations Organization (JAERO), which was established with the assistance of the JAIF and placed under the supervision of MITI.[1]

While questions relating to the civilian atomic energy program have not appeared frequently in public opinion surveys, four opinion samples completed during the 1960s do give some indication of popular attitudes toward peaceful uses of the atom. In a 1960 survey of 577 Japanese college students,[2] a ten point scale was used to measure the level of fear and level of favorable attitude toward atomic energy, the level of acceptance of its peaceful use, and the level of optimism as to its future use.[3] The results are shown below. When asked, "What would you say atomic energy is like?," 60 per cent referred to an energy source. Only 3 per cent volunteered the atomic bomb.[4] When asked what they felt the "main problem" connected with atomic energy was, 56 per cent replied "peaceful utilization" while 31 per cent named the military control issue.[5] Seventy-eight per cent opposed government experimentation with atomic energy,[6] and 73 per cent indicated they were aware of the danger of radiation.[7] Thirty-three per cent said they would object to having an atomic energy installation in their own neighborhood while another 43 per cent were not sure.[8] Overall, the study concluded, Japanese students' responses were "consistently very positive."[9]

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[1] Atoms in Japan, XIV (October, 1970), 26.

[2] Johan Galtung, "Atoms for Peace," in Social Implications of the Peaceful Uses of Nuclear Energy, ed. by Otto Klineberg (Paris: UNESCO, 1964), pp. 15-81.

[3] Ibid., pp. 39-47.

[4] Ibid., p. 60.

[5] Ibid., p. 62.

[6] Ibid., p. 75.

[7] Ibid., p. 72.

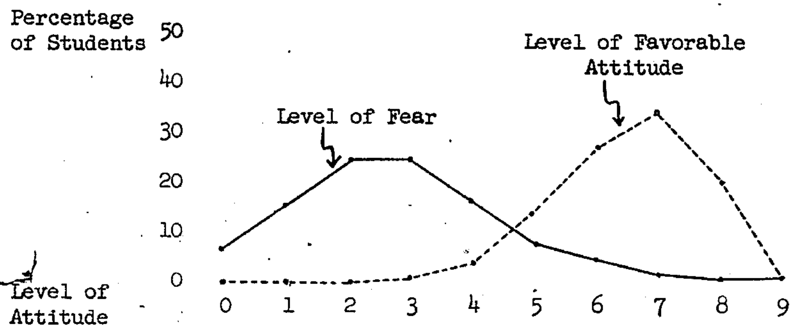
[8] Ibid., p. 76.

[9] Ibid., p. 49.

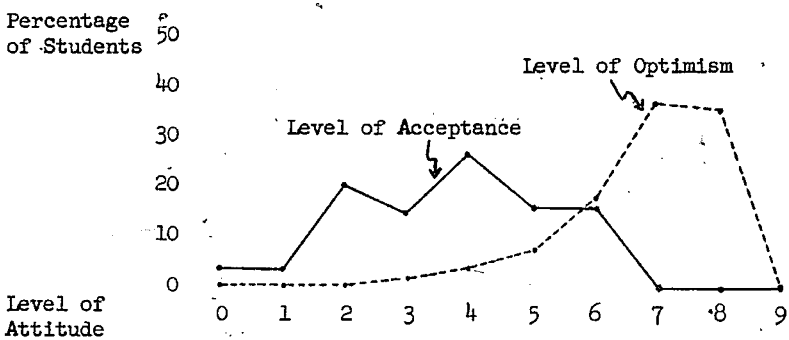
CHART 6

ATTITUDES OF JAPANESE COLLEGE STUDENTS TOWARD ATOMIC ENERGY

Level of Fear and Level of Favorable Attitude



Level of Acceptance of Peaceful Use and
Level of Optimism as to Future Use.



Source: Johan Galtung, "Atoms for Peace," in Social Implications of the Peaceful Uses of Nuclear Energy, edited by Otto Klineberg (Paris: UNESCO, 1964), pp. 39-47.

A more limited survey taken by the Tokyo Shimbun in 1963 revealed an even split on the issue of whether atomic energy is dangerous. Forty-seven per cent felt that it was definitely dangerous or might be, depending on the way it was handled, while the same number felt it was not dangerous or need not be, if handled properly. Among students in the sample, only 6 per cent felt atomic energy was dangerous (compared to 26 per cent of the total sample) while 29 per cent felt it was not dangerous (7 per cent in the total sample). Overall, 60 per cent of those surveyed felt more education was necessary in this area, and among the better educated and professional respondents, 70 to 80 per cent wanted more information available.[1]

A survey taken by the STA in 1968 found people generally concerned and well informed on atomic energy matters. Fifty-eight per cent indicated they supported the peaceful development program. However, 45 per cent were unsure of the safety of the atomic power plants and 41 per cent would oppose the siting of power stations within twenty to thirty minutes distance from their residence.[2]

The atomic energy industry has invested much time and money in building up good will and educating the public, and it obviously feels these efforts will pay dividends when it comes to locating atomic facilities in local communities. A survey conducted by the JAIF in 1968 helps to explain their optimism. The results of samples taken in two areas where atomic energy facilities were being constructed (Mihama and Fukushima) show that the rate

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[1] The survey was conducted by the Public Opinion Science Association in Tokyo and reported in the Tokyo Shimbun, Apr. 3, 1963 in DSJP, Apr. 4, 1963, p. 9.

[2] Atoms in Japan, XII (July, 1968), and Atoms in Japan, XII (August, 1968), 26-27.

of positive responses to the prospect of having atomic power reactors located nearby was much higher than for the public at large.[1]

TABLE 6

ATTITUDES TOWARD NEAR-BY ATOMIC POWER PLANTS IN SELECTED LOCAL JAPANESE COMMUNITIES

Attitude	Mihama (Neighboring area)	Fukushima (Neighboring Area)	Fukushima (5-8 KM from site)	National Average
For	50.7%	56.5%	40.8%	18.0%
Against	37.3	10.2	22.2	41.0
Other	12.0	33.3	37.0	41.0

Source: Atoms in Japan, XIV (June, 1970), 6-7.

The JAIF has interpreted these figures to mean that existing negative attitudes towards siting in nearby areas can be overcome by stressing the technological and economic advantages that accrue to a community as a result of having an atomic power plant located nearby.

The national government, too, has kept up a sustained public education program. Tokyo is also encouraging local and prefectural promotional efforts. In 1971 the STA decided to open a West Japan Atomic Energy Center in Tsuruga City, Fukui Prefecture. The Tsuruga Center, like its older counterpart in Mito City, near Tokai-mura, will direct continuous public relations programs and promote cooperation between the atomic energy establishment and citizens and groups in the local area.[2] The government has also begun funding a nation-wide program of joint industry-prefecture radiation

[1]The study, entitled "Influence on Local Communities by Construction of Nuclear Plants," was conducted by the JAIF under the direction of Professor Matsui Tatsuo of Waseda University. The survey teams were under the direction of Professor Sasao Hitoshi of Nippon University.

[2]Atoms in Japan, XV (September, 1971), 35.

monitoring facilities of the type begun earlier in Fukushima and Fukui.[1]

Atomic Reactors and Public Safety

The atom, despite the promise it offers for a practically unlimited source of electrical power, has one major drawback. It can kill people. Since an atomic reactor is, in essence, an atomic bomb exploding very slowly, there is always the problem of controlling the fission process. There is also the danger of slow leakage of radiation, less dramatic but potentially just as dangerous to human life.

The Japanese, like most other people, want maximum benefits from the atom but with minimum risk. Japan is a crowded country. It is also on the Pacific earthquake rim. Suitable power plant sites which are geologically stable, relatively uninhabited, and at the same time adjacent to the populated area they will be serving, are scarce. A working paper from a MITI survey undertaken in the mid-1960s illustrates the problem. MITI was, at the time, seeking to acquire twenty to thirty sites on which they planned to construct reactors in the 30,000-40,000 MW range. The river network in Japan is poor, and the few rivers with potential for power plant operations were being heavily used by the local populations. Only 10 per cent of the Japanese coast was deemed geologically suitable for such use, while 80 per cent of this suitable coastline was geographically distant from the population areas the reactors were suppose to serve. The survey group's suggestion was that less preferable sites--hillsides, soft ground, underground--were the only alternative. It was further recommended that seismological studies, tighter safety laws, and a nation-wide educational

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[1] Atoms in Japan XVI (May, 1972), 89.

campaign precede siting decisions.[1]

The JAEC and the electric power companies have done their best to convince the people that nuclear power plants are safe. But even they do not challenge the laws of probability and claim that there is no chance of an accident. Through equipment malfunction or human error, an explosion or radiation leakage is possible. Even in normal operation a certain amount of radioactive material is nearly certain to escape from an atomic facility. What exactly are the chances that an accident will take place? How much extra radiation can people absorb into their bodies as a result of "normal" operations, before the dosage becomes dangerous to health? If such operations do constitute a risk to health, is the risk justifiable in terms of the overall benefits to society? If so, what responsibility has the government to those people who assume that risk, willingly or unwillingly? How far does this responsibility go? The Japanese have grappled with these questions of siting, risk and indemnity. They have not found entirely satisfactory answers, and the debate still continues. Each of these issues will be examined in turn.

Atomic power plant siting The first public outcry against the government's atomic energy development plan came in 1957. Uji, a small town in Kyoto Prefecture, had been chosen as the site for the Kansai research reactor. The Uji River, on which the reactor was to be located, served as the source of the water supply for millions of people in the Osaka area downstream, however, and the public outcry was so great the site was given up.[2]

Over three years passed while four other sites were considered. After

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[1] Atoms in Japan, X (November, 1966), 13-15.

[2] Atoms in Japan, I (No. 5, 1957), 13-14.

three failures, Shijonawate in Osaka Prefecture was selected. The location had been approved by the Prefectural Council for the Peaceful Utilization of Atomic Energy chaired by the Vice-Governor. The project was to be subsidized by the central government. The Council announced its decision in December, 1960 and launched a local public relations campaign by inviting Nakasone Yasuhiro, the JAEC chairman at the time, to speak. All seemed to be going as planned until Nakasone's formal announcement in Tokyo a week later of the imminent construction of the reactor. Suddenly an opposition group coalesced and began sit-down protests. The town assembly passed a resolution rejecting the prefectural government's approval of the reactor plan. By the end of January, 5,000 signatures (90 per cent of the eligible voters in Shijonawate) had been collected on a petition, and this site was also dropped.[1] Eventually, another town in Osaka Prefecture, Kumatori, was selected, this time without opposition.[2]

Discontent over siting decisions has also cropped up periodically at Tokai-mura. Tokai-mura is located in rural Ibaraki Prefecture northeast of Tokyo, and until it was chosen as the Oak Ridge of Japan, was just an isolated fishing village of no particular distinction. Partly because of its isolation, it was selected as the nerve center of the atomic energy development program.

Tokai-mura was also the site of the Mito Bombing Range, used by the United States Air Force since the end of World War II for target practice. The advisability of locating highly volatile and delicate atomic machinery within yards of the Mito Range had been questioned for several years. In July, 1959 the JAEC conducted public hearings and gave every indication of

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[1] Nihon Keizai, Feb. 3, 1960 in DSJP, Feb. 4, 1960, p. 19.

[2] Atoms in Japan, XIV (December, 1960), 21.

proceeding as planned, despite testimony from Governor Iwagami of Ibaraki Prefecture that over 160 cases of mis-bombing had occured since 1954. The twenty-two kilometer danger zone announced by the U.S. Forces actually included the entire site upon which the first reactor of the JAERI laboratories was to be built.

The Socialists opposed the installation, and did their best to derail the government's plans during the autumn Diet session. Sohyo (General Council of Japanese Trade Unions) supported the Socialists by complaining to the JAEC. Nevertheless, the JAEC Special Committee for Reactor Safety approved the site in November for construction of the Calder-Hall reactor, which itself had been under fire.[1] The following month Prime Minister Kishi formally approved construction of the reactor site for JAPCO after restrictions were placed on flight patterns and the type of weapons that could be tested at the Mito Range.[2]

Criticism of the government's safety standards continued. In February, 1961 the Japan Science Council sponsored an atomic energy symposium on the safety theme.[3] Speakers called down the government for failing to set sufficiently strict standards on siting, reactor design, and emergency radiation procedures. They claimed that much of the Kansai siting misunderstanding had been caused by the "high-handed and forceful" administrative attitude. Moreover, the symposium called for a safety committee, independent of the JAEC whose primary function was to promote atomic energy, which would oversee safety standards, maintain close contact

[1] Atoms in Japan, III (October-November, 1959), 1-9; Mainichi Shimbun, Nov. 5, 1959 in DSJP, Nov. 5, 1959, p. 11.

[2] Atoms in Japan, III (December, 1959), 1-4.

[3] The symposium was jointly sponsored by the JSC, the Atomic Energy Society of Japan, and the Japan Radiation Research Society.

with experts outside as well as within the government, and press for adequate funding for the safety program.[1]

The JSC safety symposium also called for a halt to construction of additional facilities at Tokai-mura.[2] Concern that too much of Japan's atomic energy complex was being concentrated in this small area was heightened by the continued bombing at the Mito Range. When misplaced bombs fell into the village, the issue came before the Diet Special Committee for the Promotion of Science and Technology. The JAEC protested to the Foreign Ministry and U.S. Air Force headquarters in Japan. Bombing runs were temporarily suspended, but resumed in April on the proviso that practice take place below three thousand meters.[3]

The Mito Range issue again surfaced publicly in 1964 during discussion of the planned fuel reprocessing facility for Tokai-mura. Six thousand people from Ibaraki Prefecture, including the Governor and some Diet members, held a meeting next to the firing range to protest the bombing and to petition the government to suspend all flights immediately. In response, the Cabinet directed Foreign Minister Shiina and Japan Defense Agency Director Koizumi to talk with U.S. Forces representatives on the matter.[4] Talks and protests continued intermittently until 1969 when Governor Iwagami agreed that if the Mito Range were removed by the time the plutonium reprocessing plant was ready for operation, conditions set by the Prefectural government would be met.[5] The Cabinent decided in September to seek transfer

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[1] Atoms in Japan, V (February, 1961), 6-7.

[2] Ibid., pp. 10-11.

[3] Atoms in Japan, V (April, 1961), 1-3.

[4] Atoms in Japan, VIII (September, 1964), 23-27.

[5] Atoms in Japan, XIII (July, 1969), 11.

of the range within the next three to four years.[1]

Meanwhile, the JAEC was seeking to put together a more comprehensive approach to reactor siting. A Special Sub-committee on Zone Planning of the Atomic Energy Center Environs was established in September, 1962 to bring about "harmonious regional development" of Tokai-mura. Not only safety issues, but also personnel services and programmed land usage matters were to be included.[2] In 1965 a zoning plan which urged that planning for nuclear centers in the future include population controls was submitted to the Diet. It was suggested that no increase in population be permitted within two kilometers of a facility, and that high density be restricted within six kilometers.[3] The JAEC budget request for 1966 included a comprehensive six-year plan for roads and disaster warning communications network for Tokai-mura. The ¥271 million ($753,000) proposed for the project by the JAEC was cut back to ¥130 million ($361,000) in the Diet.[4]

Among the Japanese residents of local areas affected by nuclear power plant sitings, fishermen are unusually sensitive. Not only are they concerned with the hypothetical safety issue, but they see their very livelihood threatened by the thermal and radiation pollution of the plants which are frequently located on or near the coast. The Federation of Fishing Unions began filing petitions with the Diet and local assemblies in 1966 demanding that further surveys on safety and waste disposal be made, that no fuel reprocessing facilities be located in coastal regions, and that

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[1] Atoms in Japan, XIII (September, 1969), 32.

[2] Atoms in Japan, VI (October, 1962), 8-11.

[3] Atoms in Japan, IX (May, 1965), 20-21.

[4] Atoms in Japan, X (January, 1966), 8-9.

the Union be consulted prior to any site construction.[1]

The plutonium reprocessing plant at Tokai-mura came under fire from the Ibaraki Prefectural Federation of Fishery Cooperative Unions in 1968. The Union demanded that extensive marine surveys be carried out under the dual supervision of the Fisheries Agency and the JAEC. Before proceeding with construction of the facility, the JAEC agreed to take proper safety precautions and to consider establishing a central watch system.[2]

According to a 1971 JAIF survey, within thirty years Japan will need some forty new atomic power plant sites.[3] Locations for these sites will not be found easily. Public opposition to building reactors in or near urban areas has been evident for some time. Proposals to utilize empty reactional areas, like the national parks, have also caused adverse reactions.[4] As noted above, Japan is not well suited to the construction of atomic power plants either from the standpoint of geology, geography, or demography. Most of these plants will be situated on the coast or offshore, adjacent to populated areas. The FBR prototype is to be located near Tsuruga City, four kilometers from the present Mihama plant.[5] An offshore Okinawa power plant and desalting facility is under consideration for around 1975.[6] JAEC Commissioner Arisawa has been urging a new atomic center in

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[1] Atoms in Japan, X (December, 1966), 18-19.

[2] Atoms in Japan, XIII (December, 1969), 11-12; Mainichi Shimbun, Mar. 26, 1969 in DSJP, Mar. 27, 1969, p. 12.

[3] This estimated need is based upon a projected 220 million KW total atomic power capacity with 5,000,000 to 6,000,000 kw output per site. See the JAIF report entitled "Nuclear Vision for the Year 2000" in Atoms in Japan, XV (May, 1971), 8.

[4] U.S. AEC (Tokyo Office), Biweekly Report, Feb. 25, 1972, p. 2.

[5] Atoms in Japan, XIV (May, 1970), 31.

[6] U.S. AEC (Tokyo Office), Biweekly Report, Jan. 14, 1972, p. 7.

Shimokita, at the northern tip of Honshu, to relieve the overcrowding at Tokai-mura.[1] Meanwhile, in December, 1971 the JSC adopted a resolution against any further building of nuclear power plants in Japan. This stand was publicized by a demonstration in Tsuruga the following month.[2] Whatever the outcome, one thing is certain. The problems of siting are soon to become much more severe than heretofore.

Atomic reactors and risk Public concern over the location of atomic power plants does not derive simply from aesthetic sensibilities, nor from the external diseconomies associated with any major industrial facility in densely populated areas. There is genuine concern over the danger to human life that these operations entail. Environmental and civic action groups, in Japan as elsewhere, sometimes denounce the risks associated with atomic power reactors in terms glowing with all the attendant horrors of the apocalypse. Electric power industry spokesmen and governmental promotion agencies respond in more prosaic terms of stress tolerances and statistical probabilities of equipment malfunction. Such unstructured charges and countercharges frequently leave the public back at the beginning, its anxieties skillfully articulated, its laymen's abstractions of scientific wonders made to seem more near than ever, but still left to ponder just what it all means in terms of individual lives.

The concept of risk is a particularly difficult one to pin down. While virtually all the experts would agree that a certain degree of risk does exist whenever radioactive materials are being utilized, they have been unable to agree on the nature of the risk or even how to measure it. At one

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[1] Atoms in Japan, XIII (March, 1969), 12.

[2] Atoms in Japan, XVI (February, 1972), 28-29.

time the "threshold" theory held that the human body could be exposed to certain levels of radiation without danger. As long as the amount of radioactive particles bombarding the body did not pass beyond the "threshold," there was no danger to health. More recently this theory has been challenged by the "linear" concept which holds that any exposure to radiation, however small, entails some biological risk. Such exposure need not adversely affect the subject's health, but the risk is still there, either to the subject being irradiated or, through him, to future generations. The linear theory has stimulated research on radioactivity which has shown that the effects of radioactive exposure can be cumulative, and that it affects different body organs to different degrees.[1]

The debate over risk began in earnest in Japan after the International Commission on Radiological Protection (ICRP) established a "permissible" radiation dosage in 1959. The Japan Science Council issued a critical statement of the ICRP report claiming that they wished to dispel the misconception that because a dosage had been labeled "permissible" there was no danger to health. The five rem[2] per capita per year standard set by the ICRP was still dangerous, the Science Council said, and it denounced the "permissible" dose concept as unscientific. The JSC held that any "permissible" level of exposure should be determined by the people so affected. The Radiation Council, which advises the PrimeeMinister on such matters, accepted the ICRP report, and recommended that a maximum allowable dosage be maintained, but reduced from the five rems set by the Commission.[3]

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[1]See Barry Commoner's discussion of this theoretical dispute in Nuclear Power and the Public, ed. by Harry Foreman (Minneapolis: University of Minnesota Press, 1970), p. 229.

[2]The rem is a measure of exposure to radiation.

[3]Atoms in Japan, III (September, 1959), 18-22.

The JAEC in June, 1958 had established a Sub-committee on Safety Standards of Nuclear Reactors which was working on the "permissible" dose question. The sub-committee's first draft on siting was presented to the JAEC in November, 1962, but after "heated discussion" the participants could not arrive at any precise rules or standards for determining exposure effects. The report spoke in vague terms of "proper safety measures" and "sufficient distance" between reactors and the public.[1]

Other studies were also underway at this same time. A JAIF Atomic Power Study Group at Tokyo University reported in 1966 on research they had conducted on the reduced life span that could likely be expected by individuals in the vicinity of a reactor. The study group concluded that people living near a site could reasonably expect their lives to be shortened by .0007 years, or six hours. At the outside limit, those individuals exposed continuously to 0.5 rems for seventy years could expect to lose 0.7 years, or eight and a half months, from their normal life span.[2]

A survey conducted by Japanese fishing associations included a study of European attitudes on radiation. The visiting Japanese discovered little evidence of public concern in Europe, and concluded that Japanese psychology on the nuclear safety issue was different from that of the Europeans. As with other investigations, the fishing industry noted that danger from radiation existed, but that it was impossible to determine in exactly what degree. The study recommended that a full investigation follow.[3]

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[1] Atoms in Japan, VII (November, 1963), 7-21.

[2] Atoms in Japan, X (August, 1966), 12.

[3] The survey was conducted jointly by the Japan Fisheries Resources Conservation Association and the National Federation of Fishery Cooperatives Association. See Atoms in Japan, XI (September, 1967), 22; and Atoms in Japan, XI (November, 1967), 17-19.

The safety issue has most recently flared over defects discovered in the emergency core cooling systems (ECCS) of certain types of light water reactors produced in the United States. The issue came to public attention in Japan through accounts in the Washington Post.[1] The Japanese government was reassured of the safety of the American equipment in use in Japan, and a five-man investigation team representing the STA, MITI, and the university community began a tour of American installations in June, 1971. Nevertheless, the uproar over the safety of American reactors such as has recently occured in connection with the Calvert Cliffs plant near Washington, and statements by the Union of Concerned Scientists on the questionable safety features of the ECCS have given more substance to Japanese anxieties.[2]

In Japan, the JSP seized upon the ECCS revelation, and demanded that the government bring to a complete halt present and planned operations until a new, independent reactor safety program could be organized. The socialists called, also, for greater participation by local governments and citizen groups in establishing siting and safety requirements. On this latter point, they were supported by the Local Autonomies Liaison Committee Among Nuclear Site Cities and Towns, which represents twenty local governments that are most intimately concerned with atomic power development.[3] Even if the ECCS question is satisfactorily resolved, as the U.S. AEC has said it will be, the incident points up the need both for closer coordination in testing and safety monitoring between technology exporting and importing countries and, on the national level, for more participation in the decisionmaking process by local political institutions.

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[1] Washington Post, May 26, 1971, p. A1:5; and May 28, 1971, p. A4:1.

[2] U.S. AEC (Tokyo Office), Biweekly Report, July 30, 1971, pp. 1-2.

[3] Atoms in Japan, XV (June, 1971), 2-6.

All of the discussion of risk can be distilled to the fundamental question, "How safe is safe enough?" Operational efficiency and cost can be traded-off indefinitely for increased operational safety. Still, at some point, if the public desires the benefits that atomic energy can bring to society, they must put a price on human life. The mind recoils at such an outrage and it is doubtful that any satisfactory political solution can ever be found for such a moral dilemma. However, in the aggregate of social actions a statistical solution may be possible. Chauncey Starr, Dean of the UCLA School of Engineering and Applied Sciences, has suggested an approach which both provides a rational basis for calculating risk factors and removes the onus of making moral choices from the heads of political decisionmakers.[1] Barry Commoner, a public crusader for reactor safety, has cited Starr's approach approvingly, and feels that it is possible to reach a "general standard of public judgment regarding the acceptable balance between benefit and risk."[2]

Starr's basic hypothesis is a simple one. An individual is constantly taking risks in his daily life to effect some change in his environment that he perceives as useful or desirable. This utility may be physical, psychological, or a combination of both. The degree of risk that the individual accepts is proportional to the amount of utility or pleasure, real or imagined, the end result will bring him. Starr suggests that this trade-off principle between acceptable risk and perceived utility be applied to cases of risks entailed as a result of changing technology. He uses atomic power plants as an illustrative case.

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[1]Chauncey Starr, "Social Benefit Versus Technological Risk," Science, CLXV (September 19, 1969), 1232-38.

[2]Commoner in Nuclear Power and the Public, op. cit., p. 234.

Starr reasons that statistical death rates from disease, sports, flying, and other activities can be computed to give a rough rule of thumb for determining how much risk people regularly submit themselves to. He assumes that the individual preferences upon which these aggregate risk/benefit trade-offs are based are of an enduring nature, and can be used for predictive purposes. Other variables which Starr would include in his formula are the number of people undergoing the risk (he suggests that acceptable risk is inversely proportional to the number of people exposed to it), and the voluntary or involuntary nature of the risk. The degree of risk involuntarily imposed on an individual by a government, for instance, should be lower than the risk an individual voluntarily opts for of his own accord. A risk differential of ten thousand is suggested.

Starr is confident that under such a risk/benefit formula atomic power plants will prove to be at least as safe as fossil fuel plants. Conventionally fueled plants in operation today cause four deaths per million people per year, Starr estimates. Thus, atomic plants could result in an average of four deaths per million people per year and still be within the risk parameters which society finds tolerable today. He discounts fears that atomic facilities may subject the public to periodic accidents of disaster proportions on the grounds that the economics of atomic power plant operations exclude such extreme accidents which destroy much of the plant as well. For these plants to operate efficiently, and give a profitable return on the high capital outlay which is required, Starr estimates the risk rate for atomic power plants will have to be kept to something like two and a half per cent of the risk of fossil fuel plants, i.e., 0.1 deaths annually per million population as opposed to the 4.0 deaths per million population with present conventionally fueled plants.

Starr's melding of technological risk and social morality is an interesting approach to the whole gambit of technology's relationship to man. It is a rational formula which can be expanded to include as many variables as necessary. It should prove a useful decisionmaking tool in anticipating the impact of technical innovations on society, and provide some basis for making moral judgments on whether technological disruptions to society in discrete instances are justified.

Indemnity and insurance Whatever level of risk may be determined acceptable, accidents must be reckoned with. What is the responsibility of the operator in such a case? What is the responsibility of the government? Simply to see that operators are adequately insured, or to assume part of this responsibility itself even though the reactor is privately owned? What is a proper limit of liability for an operator? For the government? If an atomic facility is not adequately insured, what recourse is open to citizens who are innocent victims of a nuclear accident? These questions have been debated intensely in Japan, as elsewhere.

The liability question was catapulted into public attention as a result of the debate over the Calder-Hall importation agreement with Great Britain. The Windscale incident, coming at the same time, lent some theatrical flavor to an otherwise dry legal question. In September, 1958 the JAEC determined that property and personal liability insurance was needed for JRR-1 and JRR-2, the two JAERI reactors at Tokai-mura. Based on the amount of fuel processed in the facilities and the population density of the area, the required financial coverage was computed, and ¥27.25 million was appropriated in the 1959 budget for the insurance premium.[1] At the same time, the JAEC requested the Japan Insurance Association to form an atomic insurance

[1] Atoms in Japan, II (No. 10, 1958), 14.

pool to provide insurance needs in the future. By the following March, twenty insurance companies had raised ¥1,500 million in domestic capital and were looking for an additional ¥ 10 billion from foreign sources.[1]

The JAEC did not intend for the private sector to bear the entire insurance cost. For one thing, the government had invested heavily in the atomic energy development program and the Commission felt it was preferable for the public-private partnership to extend to this area as well. In addition, it was questionable that enough private capital could be found in Japan to underwrite the program. Nor did the utility companies wish to absorb the entire cost themselves. On the other hand, the Ministry of Finance did not look with equanimity on the prospect of the public treasury's being used to insure a largely private commercial venture. The private utilities, for their part, likewise hoped to avoid as much direct intervention by the government in the atomic power industry as possible, and so realized the need for them to press their pleas for public support very carefully.

The case for the public utilities industry was made quite clearly in a report from the JAIF Special Committee on Nuclear Hazards Indemnity, issued at the end of July, 1959. First, the report placed responsibility for public safety and atomic energy promotion squarely on the government. While private liability insurance was adequate to cover normal operations, the report maintained, the state should provide an indemnity over and above that to protect the industry and the public against extraordinary disasters, or instances that private insurers refused to cover. For instance, the insurance underwriters were balking at including a gradual accumulation of radiation

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[1] Atoms in Japan, III (February, 1959), 24-25; Sankei Shimbun, June 16, 1959 in DSJP, June 16, 1959, p. 14; Tokyo Shimbun, Mar. 6, 1960 in DSJP, Mar. 5/7, 1960, p. 4.

within the definition of a "nuclear incident." The Committee likewise recommended that the strict liability rule be applied; that is, liability with no fault assigned to the operator. This, the report said, was only fair because of the hazardous nature of atomic energy to begin with, and because of the difficulty in attributing negligence to any one individual directly. Finally, the industry spokesmen urged that liability protection cover both "direct" and "indirect" damage.[1]

Meanwhile, the government was moving to clarify public responsibility. The 1960 budget included a ¥2 billion Special Account for Nuclear Hazard Indemnity Reinsurance. A tentative upper limit on the extent of the government's liability of ¥50 billion had been suggested.[2] The JAEC, furthermore, submitted to the 1960 Diet a bill encompassing strict liability for private nuclear insurants, and a government indemnity to cover financial liabilities over and above those met by private insurance. The bill also provided for complete exoneration of the operator in the event of natural disasters. The bill was unclear on whether or not the government would assume responsibility for paying an indemnity in such cases when damage was not covered by private insurance.[3]

The JAEC's indemnity bill draft received little attention from the Diet in 1960. The ordinary session which ended in May was preoccupied with the U.S.-Japan Security Treaty extension. The extraordinary session that autumn was caught up in the election of a new prime minister when Kishi stepped down. The assassination of the Socialist Representative Asanuma

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[1] Atoms in Japan, III (August, 1959), 1-6.

[2] Atoms in Japan, III (September, 1959), 9.

[3] Atoms in Japan, III (October-November, 1959), 10-12.

Inejiro also disrupted the normal flow of business.[1]

The delay caused some apprehension within the industry that the extent of the government's indemnity would be drastically reduced or eliminated altogether. The Ministry of Finance was particularly stubborn about committing public funds to the support of private utility operations. The MOF reasoned that if the risks of atomic power generation were so great as to need such a large government financial endorsement, it would be best if the government took over control and operation of the atomic energy program altogether.

The utility companies were seeking relief on two situations in particular. The liability period to be enforced on reactor operators was set at twenty years. However, insurance ccoverage was valid only ten years after the occurance of an incident. The industry thought that this ten year hiatus, within which operators were liable for damages but not insured, should be covered by a government indemnity. On a second point, not only from the utility industry but from the public as well, there was considerable outcry. Private reactor operator insurance did not extend to cases where malice, negligence, or default in payment of indemnity fees to the government were involved. In such cases, the MOF was of the opinion that the government was freed of any indemnity payment, since the latter's responsibility extended only to the operator, not the public. The public would, of course, be without any legal recourse should such an instance occur. The industry, which minimized the likelihood that such an unconscionable act would ever be committed by a private operator, was shaken by the adverse publicity arising from the MOF's interpretation. For some time the public had been seeking clarification of the limits of state responsibility in this area, and to have

[1] Atoms in Japan, IV (October, 1960), 3-4.

the government specify the amount of the indemnity, per capita, due in various kinds of "incidents." If the MOF's stand was approved, it would make site location for future power reactors extremely difficult.[1]

Two nuclear indemnity bills were introduced into the Diet again in March, 1961, and passed the following June. The Nuclear Damage Indemnity bill outlined the requirements for insuring operators of nuclear facilities. The strict liability rule was applied with the additional provision that the operator would be exempted from any liability in the case of an exceptional natural disaster or social disorder. Liability for accidents extended only to operators of facilities, not to suppliers of nuclear source materials, the only exception being in the case of malicious intent on the part of the supplier. The bill required a maximum of ¥5 billion private insurance with a matching coverage that would be purchased from the government.[2]

A second bill, Indemnification Agreement for Nuclear Damage, provided government insurance in an amount equal to private coverage for protection against earthquakes, gradual accumulation of radiation, default by private insurers, and other contingencies not covered by private underwriters. This coverage was earmarked for public distribution, after which the government had the right of legal recourse against the operator if it so desired. Neither bill provided indemnification in the event of willful intent on the

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[1] Atoms in Japan, IV (December, 1960), 1-3.

[2] In March, 1962 the Cabinent specified the insurance coverage levels required under the Nuclear Damage Indemnity Law. All reactors with 10,000 KW or more output were required to carry a basic ¥5 billion coverage; reactors with 100 to 10,000 KW output, ¥500 million; reactors under 10 KW output, ¥100 million. By Cabinet order, rates were also assigned for other nuclear operations and for transportation of radioactive materials. Government indemnity fees were set at .0005 per cent of the total coverage limit. For the full ¥5 billion coverage, the annual fee was ¥2.5 million. See Atoms in Japan, VI (March, 1962), 5-6.

part of the operator.[1]

The two nuclear indemnification bills left certain questions unanswered. In the first place, while the maximum indemnification coverage on a reactor operator was set at ¥10 billion, no legal limit was established on the operator's liability. If the total damage went beyond this figure, it was not specified just exactly what the government's responsibility would be. It was explained however, that the ¥5 billion government indemnity itself need not necessarily be in the form of cash. Low interest bearing loans or other forms of assistance were also possible. The exact amount, as well as the form and method of distribution, would be determined by the Diet. The ambiguities in the bill were attributed by the atomic energy industry to footdragging on the part of the Ministry of Finance. The MOF opposed setting an upper limit on an operator's liability since this would force the government to be specific as to its financial responsibility in this regard. The MOF, as earlier stated, opposed having the treasury underwrite private atomic energy development, and objected to making an open-ended commitment on nuclear damage. There were no exemplars to follow on this peculiar arrangement since the United States and the Western European countries had all set ceilings on operators' liabilities.

The fate of the public in the aftermath of a potential nuclear disaster was also insufficiently spelled out in the government bills. First of all, there was no schedule by which indemnification would be made, nor was there any assurance as to how much money or other forms of aid any particular individual might receive. Also, there was no mention of coverage for latent injuries from radiation. Some observers questioned the constitutionality of a law which limited the public's right of legal recourse against the operator

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[1]Atoms in Japan, V (March, 1961), 2-5.

or the government in such instances. Atoms in Japan, the atomic industry spokesman, concluded that the issue of public indemnification was really not a legal question but one of social policy.[1] While this might tidy up a legal brief, it did nothing to diminish public apprehension over potential disasters as a result of reactor operations, and did not touch on the basic political questions at stake.

Another weakness in the nuclear compensation laws were provisions relating to atomic energy industry employees. No limits had been established for damages to be paid to industry employees as a result of radioactive contamination. In 1965 the JAEC Special Committee on Nuclear Hazards Indemnity for Atomic Industry Employees made some recommendations on this score. The Committee urged that these employees be brought within the limits of the national nuclear damage bills. Additionally, the Committee recommended that the Workman's Compensation Insurance Law should be strengthened. Medical examinations should be required before and after employment to detect possible illness and determine its relationship to employment. Sterility and abnormal childbirth deliveries should also be included in workers' benefits. The question was referred to the Labor Ministry.[2]

Little was done to assist nuclear industry employees as a result of this study, and in 1971 another JAEC Committee on Compensation for Damage Suffered by Nuclear Industry Workers was established. The Committee, composed of representatives from labor, management, government and the academic community, was to study the question for a year and make its recommendations.[3]

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[1] Atoms in Japan, V (October, 1961), 10-15.

[2] Atoms in Japan, IX (July, 1965), 17-18.

[3] U.S. AEC (Tokyo Office), Biweekly Report, Dec. 3, 1971, pp. 5-6.

Some revisions in the indemnity laws were accomplished in 1971 after another JAEC study. While the atomic industry and insurance spokesmen on the ad hoc committee saw the need for limiting operator liability and expanding the government indemnification system, neither the government nor the industry itself wished to arouse public concern on the issue. To increase the government indemnity would mean increased taxation and raise again the political question of public underwriting of private business. The industry, in turn, hesitated to bring up an issue which they feared would once again focus public attention on the siting issue. The compromise bill, which emerged from the JAEC study and was passed by the Diet in May, was simply an extension of the present system. Government indemnity coverage, which under the old law was limited to operators with government licenses as of December 31, 1971, was extended by ten years. The maximum government indemnity was raised from ¥5 billion to ¥6 billion. The only new provision was an improved compensation system for damage caused by nuclear ships in port.[1]

Nuclear Ships and Port Calls

The issue of visits of American nuclear-powered ships at Japanese ports is an interesting one from the standpoint of the public role in political decisionmaking. The question is usually approached in terms of the Security Treaty, however; the port call question also had a non-security aspect. To some degree the prolonged and sometimes violent opposition of the Japanese to visits by nuclear-propelled ships can be attributed to their anxiety over the movement of atomic reactors in and out of some of Japan's largest population centers when there was no way for

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[1] Atomic Energy White Paper, 1971 in SSJM, Oct., 1971, p. 28; and Atoms in Japan, XIV (December, 1970), 20-22.

Japanese scientists or the government to verify the safety of these reactors.

The possibility of American nuclear vessels' visiting Japanese ports was broached officially as early as 1959 when the Foreign Ministry requested the United States government to refrain from authorizing such visits until some international agreement could be drawn up which would clarify the rights and responsibilities of both parties. The United States refused to be bound on the issue, but assured the Foreign Ministry that there were no plans to bring such ships into Japan at that time. The United States promised that the Japanese government would be notified in advance if such a move were under consideration. The United States furthermore pledged to take precautions against a nuclear accident on American ships if and when they were in Japanese territorial waters.[1]

Prime Minister Ikeda was pressed on the subject when he visited the United States in June, 1961, and Defense Agency Director Shiga was questioned again by the U.S. Defense Department during a visit to Hawaii in November, 1962. On both occasions the Japanese avoided making any commitment.[2] As the estimated time of the first Chinese nuclear test drew nearer, pressure on Tokyo increased. By early 1963 it was evident that some change was under consideration. The JAEC announced that a "written estimation of safety" would be required before any nuclear vessel could enter a port area. The Foreign Ministry was concerned about public demonstrations, however, and reportedly was urging the Prime Minister to wait for a decision until after the Diet had adjourned.[3]

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[1] Tokyo Shimbun, June 14, 1959, in DSJP, June 13/15, 1959, p. 26.

[2] Tokyo Shimbun, Jan. 24, 1963 in DSJP, Jan. 24, 1963, p. 24.

[3] Tokyo Shimbun, Jan. 26, 1963 in DSJP, Jan. 29, 1963, p. 23; Mainichi Shimbun, Jan. 28, 1963 in DSJP, Jan. 29, 1963, p. 20.

By May it was clear that the government had decided to permit American nuclear ships into Japanese ports. The only question was when. A public relations campaign was launched under the direction of Foreign Minister Ohira, who stressed above all that the entry of nuclear ships did not imply the entry of nuclear weapons on these ships. Nor should these visits be viewed as a departure from past policy, since they were clearly covered by the Security Treaty. As to safety, the government advised the public that "question and answer" sessions had been held with the United States, and that the Japanese side was satisfied with American guarantees even though military secrecy prevented non-American nationals from investigating the propulsion equipment firsthand. Finally, it was explained that the United States and Japan had agreed on adequate compensation in the unlikely event an accident did occur in a port area.[1]

By August, the only outstanding issue was reported to be the discharge of reactor cooling water from American vessels. The United States was evidently reluctant to be bound by the strict Japanese standards on radioactive discharge, while the STA, whose responsibility it was to verify the safety of the ships, did not recommend relaxing these standards in view of the intense pressure which the Socialists and the Japan Science Council were bringing to bear on the port call issue.[2] The STA suggested giving temporary permission for entry into harbors, with final determination to be contingent on the ships' receiving a clean bill of health after the government had monitored radioactivity levels around them. The Foreign Ministry, which was anxious to resolve the question before the autumn Diet session, objected to this tactic as a "meaningless postponement" of the

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[1] Asahi Shimbun, May 11, 1963 in DSJP, May 16, 1963, p. 16.

[2] Nihon Keizai, Aug. 12, 1963 in DSJP, Aug. 13, 1963, p. 22.

problem.[1] However, the STA's cautious attitude was not shaken even when Sato Eisaku, a rising LDP star and strong supporter of visits by American ships, became STA Director in the midst of the debate. An unidentified STA spokesman reportedly observed, "even if an influential leader becomes the Director-General, science is science."[2] The United States evidently determined not to force the issue for the moment, since government approval which was expected before autumn[3] was not forthcoming at that time.

For the next year the subject of port calls was pointedly ignored in public by the government. STA Director Sato observed in February that this "diplomatic question" would be concluded directly after "comprehensive consideration."[4] Foreign Minister Shiina, shortly before approval was announced, could only say, "I am gagged about it." When asked if some other individuals were gagging him, he replied, "Yes, there are many."[5] On August 28, 1964, shortly after the Tonkin Gulf incident, the Cabinet approved visits by American nuclear warships in Japanese ports. The Japanese government finally accepted an American guarantee in the form of a "note verbale," dated August 24, to the effect that no wastes would be released from nuclear ships which would cause a measurable increase in radioactivity in Japanese ports.[6] Press reaction was restrained, and opposition forces resigned themselves to a long term counter-campaign and close observation of

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[1] Nihon Keizai, July 23, 1963 in DSJP, July 27/29, 1963, p. 13.

[2] Nihon Keizai, July 24, 1963 in DSJP, July 26, 1963, p. 8.

[3] Mainichi Shimbun, July 21, 1963 in DSJP, July 23, 1963, p. 13.

[4] Yomiuri Shimbun, Feb. 4, 1964 in DSJP, Feb. 5, 1964, p. 20.

[5] Mainichi Shimbun, Aug. 26, 1964 in DSJP, Aug. 27, 1964, p. 3.

[6] Mainichi Shimbun, Aug. 28, 1964 in DSJP, Sep. 2, 1964, p. 10; and "Chronology," Japan Quarterly, XV (October-December, 1968), 520.

the ships when in port.

The socialists were leaders in the extended campaign against port calls. The JSP had always opposed Japanese support of American military objectives, and the nuclear issue was the most vulnerable point on which to strike. The opposition movement was given a new angle for attack when the nuclear submarine "Thresher" disappeared in the spring of 1963. The United States never gave a full accounting of the disaster, and the JSP made the most of the mishap and its safety implications for other nuclear vessels which would be visiting Japanese cities.[1] In May, the party formed a policy committee in the Diet which it used as an official forum to dun the LDP on American naval visits.[2]

The Japan Science Council was also quite active during this period on the port call question. Professor Sakata Shoichi, a well-known academic figure from Nagoya University, in February, 1963 urged the JAEC to undertake an independent study on the safety of nuclear submarines and make the results public.[3] The following month, nine nuclear physicists, including Kyoto University Professor Yukawa, a Nobel prize winner, signed a statement of concern over the government's handling of the safety issue. The physicists' concern extended not only to the specific safety question in this instance, but also to adverse public reaction which they feared might jeopardize Japan's entire atomic energy development program should a disaster of major proportions occur in a heavily populated port area. In making their case, the Japanese scientists cited what they considered lax American waste disposal standards and warnings on the potential hazards of

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[1]Yomiuri Shimbun, Apr. 23, 1963 in DSJP, May 2, 1963, p. 5.

[2]Mainichi Shimbun, May 7, 1963 in DSJP, May 9, 1963, p. 22.

[3]Yomiuri Shimbun, Feb. 21, 1963 in DSJP, Feb. 26, 1963, p. 16.

nuclear submarines issued not only by certain European governments but by the U.S. AEC as well. By the middle of June the statement had received over 1,500 signatures.[1]

At its 39th General Meeting in April, the Science Council voted to announce that it had determined that visits by nuclear submarines were "not desirable, since the safety of the Japanese people might possibly be threatened."[2] When the government finally decided to allow nuclear ships to visit Japanese ports in August, 1964, the scientists accused it of "gulping down" U.S. announcements and ignoring both Japanese scientists and the people.[3]

Popular opposition to port calls was organized around a group called the Grand People's Rally for Blocking Atomic-Powered Submarines' Calling at Japanese Ports. The Grand People's Rally worked closely with another organization with nearly as imposing a title, the Liaison Office of the Signature Movement Opposing the N-Sub Visits. The Liaison Office spearheaded the drive mentioned above which succeeded in obtaining some 1,600 signatures from scientists throughout Japan in the spring of 1963.[4] The Grand People's Rally was most in evidence in Yokosuka and Sasebo, ports in eastern and western Japan slated to receive the ships. In September, 1963 the organization reported that it had mobilized 180,000 protesters in these two cities. By comparison, in Ibaraki Prefecture, where the atomic energy

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[1] Sankei Shimbun, Mar. 26, 1963 in DSJP, Mar. 26, 1963, p. 12 and Apr. 26, 1963 in DSJP, Apr. 26, 1963, p. 2; Yomiuri Shimbun, Mar. 28, 1963 in DSJP, Mar. 28, 1963, p. 1; Asahi Shimbun, June 15, 1963 in DSJP, June 21, 1963, p. 2.

[2] Japan Science Council, Annual Report, 1963, p. 36, cited by Long, "Science Policy in Postwar Japan," op. cit., p. 351; and Sankei Shimbun, Apr. 27, 1963 in DSJP, May 2, 1963, p. 21.

[3] Tokyo Shimbun, Aug. 29, 1964 in DSJP, Sep. 2, 1964, p. 1.

[4] Atoms in Japan, VIII (September, 1964), 19-22.

development program was centered, there was little public interest in the movement outside of some labor union activity.[1] This latter fact lends some support to the thesis that the protests against visits by nuclear ships were motivated, in part at least, by the perceived danger from radioactivity and not entirely by purely political, anti-American sentiments.

Public sentiment was by no means solidified on the port call issue. A survey taken in the autumn of 1963 revealed that only 23 per cent of the public rejected the visits outright. Another 33 per cent indicated they could accept the port calls (13.7 per cent called them "unavoidable" and 19 per cent approved of them under certain conditions). Fourty-four per cent answered that they did not know, suggested further study of the question, and the like.[2]

While the government had won the battle over nuclear ship visits,[3] the opposition kept the issue as hot a political question as possible, The socialists began a series of moves within the Diet to embarass the government. Socialist legislators and some well-known scientists gave public addresses criticizing the government's decision.[4] Numerous local citizen groups were formed. By the end of October, 1964 the Police Agency reported that draft resolutions against the submarine visits had been drawn up in twenty-three prefectures, seventy-eight cities, and fifty-six towns and villagesassemblies.[5] The Japan Science Council, at its Forty-second General Meeting that month, called upon the JAEC to state what "autonomous, scientific

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[1] Mainichi Shimbun, Oct. 10, 1963 in DSJP, Oct. 15, 1963, p. 13.

[2] Kahoku Shimpo, Oct. 28, 1963 in DSJP, Nov. 5, 1963, p. 12.

[3] The first nuclear submarine called at Sasebo on November 12, 1964.

[4] Sankei Shimbun, Sep. 11, 1964 in DSJP, Sep. 17, 1964, p. 5.

[5] Tokyo Shimbun, Nov. 2, 1964 in DSJP, Nov. 5, 1964, p. 1.

deliberations" it had undertaken before confirming the safety of the atomic submarines.[1]

The protests criticizing the government as ineffectual in safeguarding the public from atomic reactors located on board foreign ships were not entirely lost on those in office. After the submarine debate had subsided, the STA spearheaded a drive to bring non-military nuclear-propelled foreign vessels under Japanese atomic reactor laws. The proposal, which was enacted into law early in 1965, required prior application to the Prime Minister by any nuclear ship seeking to enter a Japanese port. If the Prime Minister, after consultation with the JAEC, was satisfied as to its safety, he could grant permission to call. If not, he could require the reactors to be stopped, remodeled, or otherwise adjusted to conform to safety laws. While military security prevented this law from being applied to warships, it would bring commercial ships like the "Savannah" under closer control.[2]

By the autumn of 1966 nuclear submarines were visiting Japanese ports without any significant public opposition. The "Snook" visited Yokosuka, near Yokohama, at the end of May and was greeted by no untoward reaction outside of a standard protest demonstration.[3] When the "Seadragon" entered Yokosuka in September there was so little reaction that the _Kanagawa Shimbun_ felt called upon to caution against those who "smile in glee at the sight of the retreat of the opposition movements."[4] The _Asahi Shimbun_ agreed that the

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[1] _Asahi Shimbun_, Nov. 1, 1964 in _DSJP_, Nov. 2, 1964, p. 1.

[2] _Tokyo Shimbun_, Feb. 27, 1965 in _DSJP_, Mar. 4, 1965, p. 17 and Mar. 1, 1965 in _DSJP_, Mar. 5, 1965, p. 15.

[3] _Yomiuri Shimbun_, May 30, 1966 in _DSJP_, June 1, 1966, p. 3; _Sankei Shimbun_, June 4, 1966 in _DSJP_, June 7, 1966, p. 23.

[4] "Becoming 'Too Familiar' with Atomic-Powered Submarines," _Kanagawa Shimbun_, Sep. 6, 1966 in _DSJP_, Sep. 7, 1966, p. 1.

issue had become largely defused by this time.[1]

The question was once again raised in a dramatic fashion in May, 1968 when monitors in Sasebo harbor, near the visiting nuclear submarine "Swordfish," registered radioactive emissions ten to twenty times above normal.[2] STA officials, who were responsible for making an investigation on the Japanese side, made every attempt to keep the incident from becoming a left-wing _cause celebre_. The Prime Minister and the Cabinet were naturally concerned lest this radioactivity issue provide new ammunition for the opposition to use against the government's liberal support of the Security Treaty and American actions in Vietnam. The STA and the JAEC, in particular, were further chary of increasing public fears of nuclear reactor accidents at the very time they were seeking approval of sites for a host of new atomic power plants.[3]

The STA investigators found it difficult to reconcile their own responsibilities for an objective scientific inquiry with the competitive political interests impinging on them from opposition forces in the Diet, the Cabinet and the United States. The STA was criticized in the Lower House for its slowness to react to this public health hazard,[4] while Chief Cabinet Secretary Kimura, speaking for the Prime Minister, noted that the investigators were looking at the question from a "purely scientific position." Their opinion, he stated, need not necessarily be identical to those of the government, which must take into account broader political

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[1]_Asahi Shimbun_, Sep. 6, 1966 in _DSJP_, Sep. 9, 1966, p. 19.

[2]_Yomiuri Shimbun_, May 8, 1968 in _DSJP_, May 9, 1968, p. 19.

[3]_Atoms in Japan_, XII (June, 1968), 3-6.

[4]_Tokyo Shimbun_, May 9, 1968 in _DSJP_, May 10, 1968, p. 1.

considerations like the Security Treaty and future port calls.[1] The United States, in the meanwhile, proclaimed the "Swordfish" innocent of any abnormal radioactive emissions, but retreated behind a cloak of military secrecy and refused to release any hard data.

The JAEC suggested postponing all nuclear submarine visits until its study was completed, and would have preferred to have received a pledge from the United States Navy not to release any coolant water while in Japanese ports. However, the Foreign Ministry, in interpreting the U.S.-Japanese 1964 note verbale on this question, agreed that such discharges were permissible during normal operation of nuclear ships, provided the increased radioactivity was within limits set by the International Commission for Radiological Protection.[2]

On May 27 the STA study group completed its study. Since no conclusive evidence was available to the investigating team, the United States could not be proved to have been at fault. However, Yamazaki Fumio, chairman of the survey group, announced that under the circumstances the United States Navy was presumed at fault. On the 30th, talks began between the two governments to establish stricter controls on radioactive emissions in the future.[3]

The dilemma facing the STA was clear. On the one hand, the Agency concluded that excessive radioactive emissions had taken place and that the "Swordfish" was the culprit. JAEC Chairman Nabeshima urged the government

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[1] Sankei Shimbun, May 27, 1968 in DSJP, May 28, 1968, p. 3.

[2] Tokyo Shimbun, May 20, 1968 in DSJP, May 20, 1968, p. 1; Sankei Shimbun, May 30, 1968 in DSJP, May 30/31, 1968, p. 27; and "Chronology," Japan Quarterly, XV (July-September, 1968), 396-97.

[3] Atoms in Japan, XII (June, 1968), 3-6; and "Chronology," Japan Quarterly, XV (July-September, 1968), 396-97.

to insist on no coolant water discharges in port areas in the future,[1] and called for a clean bill of health from the JAEC prior to the entry of any nuclear warship into Japanese ports.[2] At the same time, so as to uphold the JAEC's credibility on the safety of atomic power reactors, the STA issued a pamphlet in June demonstrating the safety of American nuclear submarines when adequate precautions are taken. The STA's objectivity was being challenged by some Japanese scientists on the grounds that the Agency was defending military uses of nuclear energy. A JSC symposium called for banning all nuclear submarinesvisits so long as the facts of reactor operations were kept secret.[3]

Japanese and American negotiators reached an agreement in September on future nuclear submarine visits. A memorandum concluded on October 23 enjoined ships from discharging reactor coolant water except in an "emergency." Additionally, Japan agreed to improve its own radioactivity monitoring system. In reporting the agreement, Sankei noted that the definition of an "emergency" was open to interpretation, and that so long as the United States insisted on preserving the secrecy which surrounded nuclear submarine reactor operations, Japan would find "no real satisfaction."[4] As a Sankei editorial had observed at the start of the talks in May, under the circumstances, Japan would have no recourse but to settle for American

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[1]Mainichi Shimbun, May 31, 1968 in DSJP, June 1/3, 1968, p. 6.

[2]Asahi Shimbun, May 30, 1968 in DSJP, May 30/31, 1968, p. 22.

[3]"Chronology," Japan Quarterly, XV (October-December, 1968), 520; Yomiuri Shimbun, June 8, 1968 in DSJP, June 7/10, 1968, p. 45 and June 20, 1968 in DSJP, June 20, 1968, p. 10; and Asahi Shimbun, June 14, 1968 in DSJP, June 20, 1968, pp. 37-39.

[4]Sankei Shimbun, Sep. 4, 1968 in DSJP, Sep. 4, 1968, p. 23 and Oct. 25, 1968 in DSJP, Oct. 26/28, 1968, pp. 1-2.

promises to "take a prudent policy."[1]

The nuclear-powered aircraft carrier "Enterprise" also served as a point of dispute in Japan, both within the government and without. When the "Enterprise" joined the Seventh Fleet in November, 1965, the question of its making port calls at Yokohama and Sasebo immediately arose. The STA questioned the United States Navy on the safety of the ship's reactors, its waste disposal methods, crew training and records of past incidents,[2] but since there was no way for the Agency to circumvent strict secrecy imposed on the ship's operation, the JAEC declared it could not pass on the safety of the "Enterprise" in a "scientific manner," and left the matter to be decided "politically" by the Cabinet.[3]

The JAEC did approve the safety of the nuclear-powered commercial ship "Savannah" in April, 1967, however. This action gave rise to fears on the part of anti-carrier groups that the "Enterprise" also had been given _de facto_ approval, since the reactors of both vessels were reputed to be quite similar.[4] Although the "Savannah" received a clean bill of health from the JAEC, Japanese law did not provide for indemnity for damages caused by ships while in Japanese waters. When it became evident that no liability agreement could be worked out between the Japanese and American governments, in April the Cabinet decided against allowing the "Savannah" to call.[5]

In the meantime, a Cabinet decision on the "Enterprise" was postponed until at least after the end of the current Diet session in June. It was

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[1] _Sankei Shimbun_, May 30, 1968 in _DSJP_, May 30/31, 1968, p. 27.

[2] _Tokyo Shimbun_, Feb. 14, 1966 in _DSJP_, Feb. 12/14, 1966, p. 1.

[3] _Tokyo Shimbun_, Jan. 16, 1967 in _DSJP_, Jan. 18, 1967, p. 2.

[4] _Sankei Shimbun_, Apr. 13, 1967 in _DSJP_, Apr. 14, 1967, pp. 31-32.

[5] "Chronology," _Japan Quarterly_, XIV (July-September, 1967), 394.

suggested that it would have been too embarrassing to the government to have approved the visit of a nuclear warship supporting American military operations in Vietnam when it had just rejected a visit by the commercial ship "Savannah" for reasons of safety.[1]

Although public safety was sufficient justification to prevent a port call by the "Savannah," Japanese obligations under the Security Treaty overrode such considerations in the case of the "Enterprise." In view of the inspection restrictions imposed by the United States, the Japanese government truly had no choice but "to trust to the guarantee of safety by the U.S. AEC . . . ."[2] Accordingly, the Cabinet agreed on November 2 to admit nuclear aircraft carriers. Foreign Minister Miki reiterated the American pledge that there would be no nuclear weapons on board the ships while in Japanese waters.[3]

Some people professed to see a dual purpose in the authorization of the "Enterprise" visit. The Tokyo Shimbun, for example, accepted the visits on the basis of Security Treaty obligations, but questioned whether the government might not also be using the case to condition the Japanese people to nuclear weapons.[4] Asahi, too, noted the "educative" aspect of the "Enterprise" port call in what the editor described as a campaign under way since 1964 to "desensitize" the public to the issue of nuclear weaponry.[5] The charges, whatever actual substance they may have contained, stung to the

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[1] Asahi Shimbun, Apr. 20, 1967 in DSJP, Apr. 21, 1967, p. 31; Nihon Keizai, Apr. 27, 1967 in DSJP, Apr. 28, 1967, p. 1967, p. 39; Tokyo Shimbun, June 9, 1967 in DSJP, June 9, 1967, p. 19.

[2] Mainichi Shimbun, Nov. 2, 1967 in DSJP, Nov. 3/6, 1967, p. 3.

[3] Asahi Shimbun, Nov. 2, 1967 in DSJP, Nov. 3/6, 1967, p. 29.

[4] Tokyo Shimbun, Jan. 8, 1968 in DSJP, Jan. 10, 1968, p. 1.

[5] Asahi Shimbun, Nov. 2, 1967 in DSJP, Nov. 3/6, 1967, p. 23.

extent of eliciting a public denial from Foreign Minister Miki. Just prior to the entry of the "Enterprise" into Sasebo in January, 1968, he stated:

> It is necessary to have the people have a correct knowledge about nuclear devices, but the Government does not have the intention to dissolve the nuclear allergy by means of nuclear-powered surface naval vessels. It is solely due to an obligation under the Treaty, and it has nothing to do with the nuclear allergy.[1]

All of the opposition parties came out against the visit. Public safety was an issue, albeit a peripheral one. Primarily the visit was contested on the basis of the support it gave to American military operations in Vietnam, and on the assumption, despite American and Japanese official assurances to the contrary, that the "Enterprise" was bringing-in atomic weapons to Japan in violation of the three non-nuclear principles.[2]

Even within the LDP opinions were divided. Chief Cabinet Secretary Kimura expressed the views of several LDP leaders when he cautioned that "national sentiments must be considered prudently." The decision of the Cabinet, however, supported Secretary-General Fukuda in his view that "(I)t is a matter of course, as a friendly nation, to approve port calls."[3] The "Enterprise" called at Sasebo in Kyushu from January 18 to 23, and on the day that the ship left port the Cabinet publicly closed ranks.[4] Kimura

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[1] Yomiuri Shimbun, Jan. 18, 1968 in DSJP, Jan. 18, 1968, p. 37.

[2] Asahi Shimbun, Jan. 18, 1968 in DSJP, Jan. 19, 1968, pp. 13-14.

[3] Miki Takeo, Ohira Masayoshi, and Nakasone Yasuhiro, among others, tended to be prudent on the "Enterprise" visit and generally supported the Kimura position. See accounts in Nihon Keizai, Jan. 23, 1968 in DSJP, Jan. 23, 1968, pp. 21-22; and Yomiuri Shimbun, Jan. 23, 1968 in DSJP, Jan. 23, 1968, p. 29.

[4] The legal question at issue was the "prior consultation" clause in the Security Treaty. Only a "major change in deployment" of U.S. forces in Japan required prior consultation between the two governments. In this case, it was decided that nuclear-powered naval vessels did not require prior consultation for short visits in Japanese ports so long as they had no combat orders while there. The "prior consultation" issue is treated more fully in Young C. Kim, Major Issues in Japan's Security Policy Debate (McLean, Virginia: Research Analysis Corporation, June, 1969), pp. 31-32.

apologized for any misrepresentation of the government's stand that might have occured as a result of his statements,[1] while Prime Minister Sato agreed to "seek the people's understanding . . ." more fully in the future.[2] The accommodation hardly touched the central issues of Japanese sovereignty and participation in the American military effort in Vietnam. The Prime Minister admitted, during questioning in the Diet on the matter of nuclear weapons on board American naval vessels visiting Japan, that after all was said and done, Japan must simply trust the United States to live up to the restrictions agreed upon by Tokyo and Washington.[3] This disclaimer of authority by the Prime Minister was no more reassuring in this context than it had been on the earlier question of verifying the safety of nuclear ship reactors.

The Public in the Decisionmaking Process

The tradition of public participation in policymaking has never been particularly well entrenched in Japan. Japanese political culture has traditionally been marked more by deference to public officials and diffuse consensus seeking rather than by challenge to public authority and open airing of grievances. Thus, it is somewhat a measure of the seriousness with which the Japanese view atomic energy, and other environmental questions as well, to find that the Japanese public has begun to turn to direct citizen involvement in political decisionmaking in these issue-areas. In large part this may be due to the fact that there have been no established bureaucratic channels to deal with these problems of the impact of technology

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[1] Asahi Shimbun, Jan. 23, 1968 in DSJP, Jan. 24, 1968, p. 6.

[2] Yomiuri Shimbun, Jan. 23, 1968 in DSJP, Jan. 24, 1968, p. 30.

[3] Yomiuri Shimbun, Feb. 6, 1968, cited by Kim, Major Issues in Japan's Security Policy Debate, op. cit., p. 33.

on society. When the need for decisionmaking has been recognized but unfulfilled through the normal political channels, group action on the local level has emerged to fill the gap.

Political decisionmaking on atomic energy issues at the national level has been preoccupied with promoting the reactor development program, and with devising an overall energy program. Little attention has been devoted to the immediate long range impact of atomic technology on the environment and its consequences for the public. Much the same can be said of environmental questions in general. This inattention to the effects of national industrialization problems has come to the point where one can truly say without resorting to hyperbole that if things continue at their present rate, the Japanese will "soon all be dead just through pollution."[1] Although radiation contamination and more traditional forms of industrial pollution are handled by separate administrative units, the public has found efforts by the national government lacking on both counts, and as a result, some of the most active citizen political involvement is found in these areas of policymaking.

The government's responsibility for ensuring the safe operation of atomic reactors was set out in the Basic Law for Atomic Energy (1956) and the various pieces of implementing legislation and administrative orders which followed it. Reactor licensing is carried out under the Law for Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (1957). The Atomic Energy Bureau of the STA is in charge of enforcing radiation safety standards, while investigation of possible violations of the safety code is the responsibility of the Committee on the Examination of

[1]The phrase is Edwin Reischauer's. See his speech "Looking Ahead in Asia," The Japan-America Society of Washington Bulletin, XVIII (January, 1973), 4.

Reactor Safety. The Committee, which was set up in 1961 and placed administratively within the JAEC, reports to the Prime Minister the results of its investigations, and is ostensibly independent of the JAEC when performing its safety monitoring duties.[1]

These national decisionmaking units have been remote from the public, however, and have never been overly quick to respond to expressed public concerns over issues of nuclear safety. Public hearings on reactor safety were held in 1959 and, during Diet debate on reactor regulation laws at that time, the Lower House passed a resolution calling for periodic hearings in the future. However, none have since been held.[2] Incidents of equipment malfunction or exposure of workers to radioactivity are sometimes reported well after the fact and without all the particulars. While no major disasters have occured to date, such insensitivity simply fuels public anxieties and leads to charges of cover up.[3]

A set of national laws and a centralized government bureaucracy also exists to enforce environmental pollution standards of non-atomic energy related industries. Legislation on air and water pollution was first passed by the Diet in 1962. The Basic Law Concerning Countermeasures Against Public Hazards was passed in 1967 to be followed in 1969 and 1970 with legislation on relief for pollution victims and the settlement of disputes arising from the national pollution laws.[4] In July, 1971 the Environmental Agency was set up in the Prime Minister's Office to deal with air and water

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[1] Atoms in Japan, XV (October, 1971), 15-18.

[2] Ibid.

[3] U.S. AEC (Tokyo Office), Biweekly Report, July 30, 1971, pp. 1-2.

[4] Setsuo Kobayashi, "Environmental Pollution," Japan Quarterly, XVII (October-December, 1970), 400-01.

pollution, noise, odors, vibration, sinking ground, and poisoning of the soil. The only time the Environmental Agency has become involved in atomic energy questions, however, is over approval of national park land for atomic reactor sites.[1] In February, 1972 the JAEC set up its own Environment and Safety Specialist Committee composed of twenty experts on "environmental integrity" from the STA, MITI, the Environmental Agency, the fishing industry and the press.[2]

The pollution laws have not been particularly effective in improving the quality of the Japanese environment for a number of reasons. In the first place, the national government has not been especially vigorous in enforcing the regulations. Although the public appears in growing numbers to be looking to government to solve questions of environmental pollution and a host of other public hazards, and while some people have suggested that as political issues they rank "in importance with those arising from the Japan-U.S. Security Treaty and Okinawa,[3] so far the LDP has not accorded such issues very high priority. Desultory attacks on specific problems, which cut across traditional administrative lines and fail to treat nation-wide problems in a comprehensive, integrated fashion, also help to account for the limited government effectiveness. Then, too, budgets are small, and there is no agreement on how to allocate the costs of anti-pollution programs throughout the society. Finally, the Basic Law on pollution stipulates that all such measures must be "harmonized with the sound progress of the

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[1] Atoms in Japan, XV (August, 1971), 26.

[2] Atoms in Japan, XVI (February, 1972), 28-29.

[3] Kobayashi, "Environmental Pollution," op. cit., p. 404. See also Jun Ui, "The Singularities of Japanese Pollution," Japan Quarterly, XIX (July-September, 1972), 281-91 for a particularly strident attack on the conservative establishment in this regard.

economy." Since much reliance is placed on self-enforcement, this qualification is subject to much abuse.[1]

Where central government initiative has been lacking, other groups have taken up the search for solutions to environmental problems. Already, trade unions and certain business elements have begun to call for local action. Citizen action groups have become involved in decisionmaking jointly with local industries through informal "gentlemen's agreements" which not infrequently set down more stringent regulations than do the national laws.[2] Local citizen groups have also begun to demand a voice in setting safety standards for radioactive substances. Unlike industrial pollution, which subsumes a great many different environmental problems stemming from a variety of industrial operations, radioactivity is more easily definable in terms of the source of emission, its potential harmful effects, and the points within the political system and economic structure at which pressure can be brought to bear to influence the decisionmaking process.

The atomic energy industry is quite conscious of its public image, and to a much greater extent than the more established industrial enterprises, fears that public opposition may interfere with selecting power reactor sites and, in general, delay the progress of its development program. For these reasons, it can be expected that citizen participation will become a more fully integrated part of policymaking in the field of atomic energy than in other environmental policy areas in Japan.

Community activity in this regard was institutionalized in June, 1968 with the first meeting of representatives from fifteen communities where

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[1]Kobayashi, "Environmental Pollution," op. cit., pp. 404-06.

[2]Ibid., p. 404.

power stations were either already built or planned. The association met in Tokyo, with the major of Tsuruga City as chairman, and announced its intention to meet regularly with government ministries, Diet members, and the JAIF to discuss policy metters of common interest.[1] On an intermediate level, Fukui was the first prefectural government, in 1969, to establish a joint radiation monitoring system with the Kansai Electric Power Company.[2] Shortly thereafter, Fukushima Prefecture and the Tokyo Electric Power Company set up a similar arrangement.[3]

The atomic energy industry has encouraged citizen participation, obviously with the conviction that greater familiarity with the atom will not breed contempt. As noted earlier in the case of the ChissonChemical Company, the atomic industry has seen the handwriting on the wall, and is making every effort to lay a base of favorable public opinion. At the fourth annual JAIF conference in 1971, a panel on "Nuclear Power Plants and the Environment" was opened, for the first time, to citizen participants. In this instance, two of the most vocal groups, the Japan Fishermen's Federation and the Japan Housewives Association, were invited.[4] Later that same year, a group of citizens from Tokai-mura and Tsuruga City joined a JAIF tour to Western Europe and the United States to investigate the attitudes there toward atomic energy sites in local communities.[5] The fifth JAIF conference in 1972 likewise stressed environmental impact and public

[1] Atoms in Japan, XII (June, 1968), 30.

[2] Atoms in Japan, XIII (August, 1969), 6; and Atoms in Japan, XIII (December, 1969), 22.

[3] Atoms in Japan, XIII (August, 1969), 6; and Atoms in Japan, XVI (May, 1972), 89-90.

[4] Atoms in Japan, XV (April, 1971), 35-38.

[5] Atoms in Japan, XV (September, 1971), 39.

opinion as major themes.[1]

In conclusion, it can be said that Japanese attitudes toward the peaceful uses of atomic energy are on the whole positive. This is especially true among the younger generation. As Japan moves forward as a major economic power and growing technology exporter in the next decades, it is to be expected that these positive attitudes will continue to sustain the rapid expansion of the Japanese atomic industry currently on the drawing boards. This is, of course, barring some unforseen catastrophic accident involving an atomic facility.

At the same time, persistent doubts about the safety of atomic energy as an energy source will continue to make this aspect of Japan's technological development a highly political issue. The JAIF has already cited the political "progressives" as using atomic energy issues to "build up their party strength." The alliances formed between the opposition parties and certain local environmental protection and anti-nuclear power plant groups have had their greatest effects so far in local elections. Moreover, as far as the atomic industry is concerned, there is evidence to believe that certain atomic scientists are responsible for much of the protest surrounding atomic power plant sites. As Atoms in Japan recently complained, "(T)he Japan Scientists' Association and student activists grouped in the National Union of Atomic Scientists and Technicians are chiefly responsible for the horror tactics."[2]

The problem of selecting sites for atomic facilities will come to occupy decisionmakers even more as the few choice locations are quickly used

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[1] Atoms in Japan, XVI (March, 1972), 16-23; and Atoms in Japan, XVI (May, 1972), passim.

[2] Atoms in Japan, XVI (August, 1972), 29-39.

up and the alternatives become situating reactors either in densely populated corridors, in off-shore fishing and recreational areas, on land of questionable geological stability, or in multi-facility sites where the dangers of nuclear accidents are multiplied. Debate can also be expected on those questions of risk and insurance where present government policy is hazy. Assuming atomic reactors log more and more hours of safe operation, the fears of atomic hazards will most likely subside. However, the principle of government responsibility to the public still remains to be sorted out, especially the extent and nature of government indemnity in cases where damage exceeds private operator liability.

The subject of American nuclear ships' calling at Japanese ports is a good illustration of the penetration of foreign military policy into Japanese domestic politics. While Prime Minister Sato was primarily concerned with fulfilling Japan's obligations under the Security Treaty, the Science and Technology Agency became caught between the demands of foreign policy and the demands for strict adherence to the safety regulations which they themselves had formulated in the domestic policy area. While the STA attempted to distract the public's attention from American atomic submarines for fear of stiffening resistance to the reactor program, the Cabinet's policy of putting Japanese ports at the disposal of the United States for an unpopular war instead drew the atomic submarines into the public spotlight. The conflict in policy goals was made to order for groups like the Japan Science Council which sought to attack Sato because of his support of American military actions, but lacked any claim to military or foreign policy expertise which would give their attacks added credence. However, the scientists could speak with an authoritative voice on the reactor safety issue, and they could sustain a steady drumbeat of opposition even when public apathy began to overtake the anti-war movement.

The government's credibility was further damaged when it refused to admit the "Savannah" but did an about-face and accepted the "Enterprise." Whatever the official rationale, the government could easily be made to appear the champion of a foreign power at the expense of the Japanese public. There could not fail to be doubts about the government's ability to control Japan's own destiny. It is not an unbridgeable jump between the image of Japan in tow to the American military and the image of the Japanese public suffering the effects of social neglect brought on by the insensitivities of a clique of zaibatsu and conservative politicians. As one study has concluded, "(T)here is more than a tentative connection between movements against pollution and the antiwar drives. Their points of common concern are the protection of the lives and livelihood of community members."[1]

It is impossible to say at this time whether the civic interest shown by the Japanese public in environmental pollution issues will be a lasting one or is simply a reaction to a particular set of circumstances. Partly this will depend on the sincerity of government and industry in seeking real input from the public. The public relations efforts of the central government and the JAIF have already been noted. STA Director Kiuchi has gone on record as soliciting public "participation" in policymaking prior to the construction of reactors.[2] On a provincial and local level there are signs of real participation in decisionmaking processes.

It is unclear just what this concept of participation entails. If it means simply informing the public prior to taking action, and is not meant

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[1]Yoshiro Kunimoto, "Pollution and Local Government," Japan Quarterly, XVIII (April-June, 1971), 167.

[2]U.S. AEC (Tokyo Office), Biweekly Report, Jan. 14, 1972, p. 2.

to bring public advocates directly into the policy process before decisions have been made, then it will mean little. However, if the commitment is to continuing exchanges of views with the public, through face-to-face meetings with their representatives and through meaningful public opinion sampling, and includes structuring policy to meet public needs, then technology can be said to have made a lasting impact on the Japanese political process.

The long term effects of this public influence on policymaking will also depend on whether the groups which are currently pursuing specific policy objectives can sustain their momentum past the point where they have achieved the immediate goals which brought them together originally. For public participation in decisionmaking to have any real long range substance, it will be necessary for Japanese as individuals to develop a commitment to the concept of political participation, and to view the articulation of public demands not merely as an expedient in discrete instances but as a basic function of the political system. Japanese behavior patterns have traditionally been keyed to the group rather than the individual. In this respect, there is a cultural basis upon which modern interest or associational groups can build. However, such civic action oriented groups must compete with other, more established groups like the company, labor unions, agricultural organizations, and political parties. It remains to be seen whether the pulls of these various groups will, on balance, work with the newer associational groups or against them.

In summary, one can conclude that the public, working through local government and citizen action groups, has had a moderate impact on policy implementation in the atomic energy area. There are groups which can serve as a basis for further involvement in the political decisionmaking process in this and related areas in the future. Whether there will be a sustained increase in public participation extending to other political issue-areas will be determined by a host of interactions within the political system too complex to prejudge.

CHAPTER VII

JAPANESE SCIENTISTS AS POLITICAL ACTORS

Mesthene has proposed that technology, by creating new opportunities for societies, raises "questions about the proper goals of society and about the proper ways of pursuing those goals."[1] It is sometimes assumed that scientists and technicians have a great deal of influence over the selection of goals and priorities, especially in policymaking areas involving complex technological matters in which political decisionmakers lack technical expertise. Since scientists are the purveyors of the knowledge upon which national policymaking depends in such areas, it has been argued that they can shape those necessary technical decisions which must be made in such a way as to have a great influence over the political aspects of decisionmaking as well. Because they possess the indispensable knowledge which fuels technological innovation and thereby promotes social change, it is said by some that a new elite is taking over the political functions of society. Depending on individual points of view, this supposed progression toward a technocracy or meritocracy is viewed with great alarm or with great fervor.

However, there is an opposite point of view which holds that there is no inevitable movement of scientists into the seats of political authority in modern technologically oriented societies. Schilling has pointed out that the participation of scientists in politics is a new but not revolutionary

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[1]Emmanuel G. Mesthene, Technological Change (Cambridge: Harvard University Press, 1970), p. viii.

concept.[1] Experts have for long served political leaders in many capacities without necessarily having any direct effect on policy formation. James Kerr has suggested that the level of scientists' participation in the policy process can vary from simply "identify(ing), definin(ing), and collect(ing) facts" for the solution of a technical problem" all the way to "actively and sympathetically participat(ing) in the policymaking process."[2] From the following analysis of the role of the Japanese scientist in atomic energy policymaking, it can be said that, in Japan, the pattern is much nearer the former level than the latter.

This chapter will review thetprocess by which Japanese scientists articulate political demands, the extent to which these demands have had an impact on policy formulation, and the perceptions that Japanese decisionmakers and scientists hold of each other and the overall decisionmaking process. Interest articulation within the scientific community will be examined both in terms of the record of the Japan Science Council and from the standpoint of the political orientation of the individual scientists. This will be followed by an analysis of the cognitive and normative attitudes of Japanese scientists and decisionmakers on the major aspects of the atomic energy development program examined in this paper. These attitudes have been determined by means of a questionnaire prepared as part of this study. Finally, a judgment will be made on the relative impact of Japanese scientists on the political decisionmaking process in Japan.

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[1] Warner R. Schilling, "Scientists, Foreign Policy, and Politics," in Scientists and National Policy Making, ed. by Robert Gilpin and Christopher Wright (New York: Columbia University Press, 1964), p. 148.

[2] James R. Kerr, "Congress and Space: Overview or Oversight?" in The Politics of Science, ed. by William R. Nelson (New York: Oxford University Press, 1968), p. 178.

Articulation of Political Interests

The Japan Science Council The Japan Science Council was established by law in 1948 as part of an Occupation program to democratize Japanese science. The representative nature of its membership in terms of academic discipline and geographical distribution has already been noted.[1] The concept of an apolitical scientific advisory body was a political innovation of the Occupation period which never took root in Japan. As a result, the experience of the JSC has been a frustrating one, sometimes controversial, but marked by a conspicuous lack of influence in policymaking councils. The legal responsibilities of the Science Council have never been clear in operational context. The law which established the JSC in 1948 spoke of the Council's mandate in terms like "discuss," "make exertion," and "coordinate," and stipulated that the government "may" seek opinions from the Science Council and "may" explain government policies to it.[2] While the JSC's relationships with political decisionmaking bodies are uncertain, the Council is fractionated internally, too. The problems of seniority, factions, and consensus-reaching which Long notes are not peculiar to Japanese scientific institutions.[3] They do, however, exacerbate the difficulties the Science Council has in making its influence felt on policy matters. Nakane has also spoken of the "fences" which Japanese institutions and occupational groups build between themselves. In the academic community this serves to restrain open patterns of communication and makes articulation of interests more

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[1] See supra, Chapter 2, "Policy Formulation: The Administrative Framework."

[2] Harry C. Kelly, "A Survey of Japanese Science," Scientific Monthly, LXVIII (January, 1949), p. 50.

[3] Long, "Science Policy in Postwar Japan," op. cit., p. 346.

difficult.[1] The combination of a poorly defined institutional mission and internal dissension helps to account for the fact that when the JSC becomes involved in national political issues there is frequently more heat than light.

The tension between the Japanese government and the Science Council is manifested in a variety of ways. Certain issues like budgets, research priorities, and the allocation of funds between "basic" and "applied" research, are probably endemic to science-government relationships everywhere. Other sources of conflict can be traced more directly to the Japanese political context. Few Japanese politicians have shown any long-range interest in scientific matters. Scientific portfolios hold no special attraction for men building political careers but, rather, tend to be treated as one more base to be touched by aspiring superstars. It is not uncommon for Science and Technology Agency directors to hold other ministerial positions at the same time. The scientific community has also been frustrated by its lack of participation in the drafting and introduction of legislation, which is largely the preserve of ministerial bureaucracies. The STA has done a respectable job promoting government science and technology programs in competition with more established and more influential ministeries. However, the STA has had to give way at times, as in cases where the MOF holds the line on budget authorizations, or where the Prime Minister and the Foreign Ministry give priority to national security and foreign policy factors, as in the port call controversy. For noneestablishment scientists, who often articulate their views through the JSC, new legislation and authority over funding and research coordination frequently acts as a

[1] Chie Nakane, Japanese Society (Berkeley: University of California Press, 1970), pp. 131-33.

bureaucratic wall effectively blocking access to the decisionmaking units.[1]

The most basic cause of the tension between the Japan Science Council and the government, however, is the fundamental ideological disagreement over basic domestic and foreign policies that exists between a broad segment of the academic community and the conservative ruling establishment. There are no organizational schemes which can overcome this basic conflict in the perception of political priorities and goals. On balance, the weight of political opinion in the JSC is with the socialists. Since the political opposition in Japan seldom has an entree to responsible decisionmaking circles on the national level, the JSC has resorted to the tactics of delay, criticism, and public remonstrance. These methods lead to charges of irresponsibility from the government, and reinforce the frustrations which led to them in the first place. A case in point is the dispute over the visits of American nuclear submarines to Japanese ports.

When the Ikeda government appeared to be on the verge of approving visits to Japanese ports by American nuclear submarines in the spring of 1963, the Japan Science Council organized scientific opinion against the proposal.[2] When the government refused to make public the results of studies on the safety of the submarines' as the JSC had requested, the group carried through a very successful signature campaign to record Japanese scientists' opposition to the visits.

The government rejected the Science Council's methods as inappropriate, and soundly chastised the instigators of the anti-submarine petition. In drawing up the government's case, the Cabinet Legislative Bureau said, first

[1] Long, "Policy and Politics in Japanese Science," op. cit., pp. 434-50, and Long, "Science Policy in Postwar Japan," op. cit., pp. 357-60.

[2] See supra, Chapter 6, " The Japanese Public as a Political Actor."

of all, the JSC had overstepped its legal jurisdiction and scientific mandate. The professional function of the Council, in the Bureau's view, was simply to advise the government and provide liaison between it and the scientific community. While the Science Council had the right to academic freedom, its responsibilities were limited to promoting science and ensuring that scientific opinions were reflected in political decisionmaking. In the second place, the JSC was felt to have broken the principle of "administrative organs as one body." The Science Council, it was pointed out, had been created by law and was administratively within the Prime Minister's Office. As such, its responsibility was to the government only, not to the public.[1]

Sometimes the clashes between the Science Council and the government over policies and priorities rebound to the disadvantage of the JSC, and give rise to disagreements within the membership. There is a certain amount of disagreement among scientists over the efficacy of the JSC's tactics, especially in view of the low ebb of its scientific advisory role in recent years. One example of this internal tension is the dispute over the JSC's nuclear energy policy.

One of the continuing concerns of the JSC is the promotion of basic scientific research. In 1965, the Council Long-Range Research Project Committee prepared a draft plan for the long-range development of atomic energy. The Long Range Research Committee is one of six standing committees in the JSC each of which has fourteen members, two from each of the Council's seven divisions. In addition to long-range research, there are standing committees for research funds, the organization of science, international scientific exchange, freedom of thought and learning, and the status and condition of scientists. There are eleven special ad hoc committees, each

[1] Tokyo Shimbun, May 9, 1963 in DSJP, May 16, 1963, pp. 12, 21.

with approximately twenty members, not all of whom must be members of the JSC. One of these special committees is for atomic energy. In addition to standing and special committees, the Science Council provides a national focus for the various scientific academies and professional societies through its fifty-eight research liaison committees. These liaison committees vary in membership from ten to forty, and are used to coordinate professional and scientific activities within Japan, to represent Japan at international scientific gatherings, and to examine plans involving specialized science fields.[1] The plan, which stressed the need for theoretical research, was presented to the Science and Technology Council which, in turn, handed it over to the Ministry of Education which sent it to the Science Deliberation Council for study. The Deliberation Council's recommendations were set out in the autumn of 1968 at the same time as the JSC's twentieth anniversary meeting. The plan caused considerable consternation in the JSC since it stressed the development of practical reactor equipment over the theoretical research which the Science Council had recommended, and additionally, called for a seventy-five per cent reduction (from ¥30 billion to ¥7.5 billion) in the JSC's proposed five-year nuclear research budget.

The JSC Nuclear Special Committee, thereupon, set up a sub-committee under Professor Takagi Shuji (Osaka University) to study the Science Deliberation Council report. In March, 1969 the sub-committee report was released. Its so-called Takagi Plan rejected the Deliberation Council report, and urged that a five-year restudy of future research projects be undertaken. During the interim, basic research in physics would continue

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[1] Yuichi Ochi, "The Organization and Activities of the Science Council of Japan," Nature, CCXL (November 24, 1972), p. 189.

to be stressed along with more practical technical applications.[1]

The nuclear scientists within the JSC immediately split into two opposing factions over the Takagi Plan. The dispute went more deeply than this single question of research priorities, for it was rooted in the disagreements which had been boiling for some time over the basic role of the university in society. University faculties had been at odds for several years over issues involving internal decisionmaking processes, student participation in administration, curriculum planning, and the whole relationship of the university to the government.[2] The Takagi Plan was put to a vote within the Nuclear Special Committee where it received a majority of votes. However, when one of the four factions into which the JSC physicists were divided defeated the motion, the Committee took it as a vote of no confidence and resigned *en masse*.

At its general meeting in April the Science Council deplored the factionalism it had just witnessed, and expressed its alarm that such behavior would endanger the future of nuclear research as a whole. At the same time, the Council called on the government to improve its procedures for reviewing policy recommendations submitted by the JSC, and challenged the government's understanding of the importance of basic research. The Council, furthermore, asked that extensive negotiations be undertaken to plan the scope and direction of future nuclear research projects. The Council's proposals had little overt effect on the government, and at the general meeting the following spring, the JSC admitted that it was losing its "magnetism" since the government simply ignored its recommendations and the

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[1] *Yomiuri Shimbun*, April 25, 1969 in *DSJP*, May 10-12, 1969, pp. 13-15; Ochi, *op. cit.*, pp. 189-90.

[2] *Asahi Shimbun*, May 1, 1969 in *DSJP*, May 8,9,13,14, 1969, various pages.

public appeared indifferent.[1]

The individual as articulator While the political role of the Japan Science Council has been ill-defined and of minimal influence on Japanese decision-making, individual scientists and scientific factions have frequently entered the political fray. Mention has already been made of the involvement of the scientific community in the continuing public debate over reactor safety ~~and in~~ the port call controversy. On other occasions, too, Japanese scientists have attempted to influence public policy. In February, 1957, for example, 350 Japanese physicists wrote a letter to the British scientific community protesting H-bomb testing as a "crime against all human beings."[2] Two years later a physicists's group wrote to Foreign Minister Fujiyama requesting the opening of a cultural and scientific exchange program with the Soviet Union.[3] Again, at the time of the signing of the Nonproliferation Treaty in 1970, Japanese scientists expressed concern over the meaning of the government reservation rejecting any restrictions on technological development for peaceful uses of atomic energy. The scientists feared that this was merely a ruse for developing nuclear weapons under the guise of a peaceful explosions program.[4]

Japanese scientists have not yet found an institutional role within the political system with which they can be comfortable. While probably few scientists would argue with Bronowski's observation that "it is not the scientist who can govern society . . . ," many undoubtly have wrestled with

[1] Yomiuri Shimbun, May 13, 1970 in DSJP, June, 20-22, 1970, pp. 14-16.

[2] Erwin N. Hiebert, The Impact of Atomic Energy (Newton, Kansas: Faith and Life Press, 1961), p. 213.

[3] Mainichi Shimbun, July 14, 1959 in DSJP, July 14, 1959, p. 8.

[4] Mainichi Shimbun, Feb. 10, 1970 in DSJP, Feb. 14-16, 1970, p. 7.

Bronowski's counterpoint that it is the scientist's "duty to teach it (society) the implications and the values in his work."[1] Yukawa, in fact, spoke some years ago about the "moral responsibility . . . for the correct development of Japan" which lies on the scientists' shoulders.[2] Just how to exercise that responsibility has not yet been determined, however. Long has commented on the conflict among Japanese scientists between "loyalty to research program objectives as against national policy objectives."[3]

Haberer, arguing in theoretical terms for greater social responsibility by scientists and scientific institutions, draws a dichotomy between the "strong 'methodological ethid'" and "weak 'institutional ethid'" of modern science. With no clear concept of what exactly the scientist's responsibility to society is, the confrontations which do occur between scientists and political authority are discrete and disjointed in nature with little, if any, theoretical conception of science as an institutionalized political force. The result tends to be what Haberer calls "prudential acquiescence." Rather than risk disruption of the work of the scientific community by a serious confrontation over some isolated issue, differences of principle are submerged in the name of sanitizing science from political contamination.[4]

While scientists in Japan object frequently to their lack of policy influence, it may well be, as Long observes, that they shun too much involvement in policy planning for fear of becoming "captive to political

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[1] Jacob Bronowski, Science and Human Values (New York: Harper and Row, 1965), p. 81.

[2] Tokyo Shimbun, Nov. 25, 1959 in DSJP, Nov. 25, 1959, p. 22.

[3] Long, "Science Policy in Postwar Japan," op. cit., p. 375.

[4] Joseph Haberer, Politics and the Community of Science (New York: Van Nostrand and Reinhold Co., 1969), pp. 305-28.

objectives which they cannot morally accept."[1] However, since Japanese scientists often have little opportunity to share in policymaking on a positive basis, many of them feel expression of "their chronic dissatisfaction to be a public duty."[2] This can lead decisionmakers to greet expressions of scientific misgivings with cynicism and derision. Prime Minister Ikeda once dismissed objections to a particular atomic reactor with the observation that, "Men of academic circles are apt to oppose for oppositions's sake. We are taking no notice of these persons."[3]

Perceptions: Scientists and Decisionmakers

Questionnaire Analysis

One objective of this study of the Japanese atomic energy decision-making process was to collect data on the attitudes of Japanese scientists and political decisionmakers (those connected directly with atomic energy policymaking) relative to the policymaking process on atomic energy policy issues. Since the author was unable to locate any existing attitude surveys which would provide this type of information, an opinion survey was prepared as part of this research project.

Opinion polls are taken extensively in Japan. All of the major daily newspapers regularly poll the public at large as well as selected professional and interest groups within the general population. There are also a number of other attitude survey groups, both government-sponsored and private, which periodically collect opinion data on the entire spectrum of

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[1] Long, "Science Policy in Postwar Japan," op. cit., p. 367.

[2] Ibid., p. 364.

[3] Sankei Shimbun, Marr 15, 1961 in DSJP, Mar. 15, 1961, p. 10.

domestic and foreign policy issues. Thus, the Japanese are familiar both with polling techniques and with the purposes of such surveys. Because the Japanese place great importance on reaching consensus before décisions are made, the results of national opinion polls are frequently cited as evidence for or against any particular proposed policy decision.

The following analysis is based on the results of a questionnaire prepared by the author and mailed to 550 Japanese scientists, administrators, and Diet members in December, 1972. The sample, as shown below, includes 210 members of the Japan Science Council, 20 members of the Special Committee for Science and Technology Promotion Measures of the Diet, and 320 administrators in various ministries and agencies of the executive branch of government. A complete listing by name of individuals contacted is provided in Appendix V.

The sample for this questionnaire was drawn from administrative agencies engaged in various aspects of atomic energy policymaking, from the Diet committees directly concerned with science and technology issues, and from the scientific community. The names of individuals employed in government agencies were selected from the Shokuin Roku, a government personnel directory published annually by the Ministry of Finance. Members of the Diet Joint Committee on Science and Technology Promotion were obtained from the Kokkai Binran (Diet Manual), the official directory of the legislative branch of the Japanese government. The sample of Japanese scientists was drawn from the membership directory of the Japan Science Council.

The questionnaire was prepared by the author in English (Appendix III) and then translated into Japanese (Appendix IV). The Japanese version was addressed to each individual along with a covering letter (Appendix II) explaining the purpose of the study. Approximately two weeks after the questionnaires were posted, reminders in the form of a postcard (written in

TABLE 7

DISTRIBUTION OF QUESTIONNAIRE BY ORGANIZATION

Organization	No. of Individuals Contacted
Japan Science Council (JSC)	210
Diet Special Committee for Science and Technology Promotion	20
Japan Atomic Energy Commission (JAEC)	7
Science and Technology Agency (STA), Atomic Energy Bureau	74
Japan Atomic Energy Research Institute (JAERI)	218
Ministry of International Trade and Industry (MITI), Public Utilities Bureau, Atomic Power Section	12
Ministry of Foreign Affairs (MFA)	
United Nations Bureau	3
Science Section	6
Total	550

TABLE 8

RESPONSE TO QUESTIONNAIRE BY PROFESSIONAL CATEGORY

Profession	No. of Responses	Percent of Total Responses
Atomic Scientists	72	41
Social Scientists	39	22
Physical Scientists	37	21
Political Decisionmakers	29	16

English) were sent. A total of 550 questionnaires was sent and 177 valid replies received, giving a 32 per cent response rate.

In addition to answering forty substantive questions, each respondent was asked to indicate his area of professional expertise in one of four areas. Out of the total 177 responses received, seventy-two (41%) came from atomic scientists, thirty-nine (22%) from social scientists, thirty-seven (21%) from physical scientists other than those in atomic-energy related fields (hereafter designated simply as physical scientists), and twenty-nine (16%) from political decisionmakers. Because of the limitations imposed by time and money, it was not possible to structure the distribution of respondents according to strict statistical standards of opinion sampling. The following analysis and any implications the reader may wish to draw from it, will be of an impressionistic nature. The overall pattern of responses, rather than specific responses on individual questions, should be taken as a measure of the pattern of relationships between Japanese scientists and political decisionmakers.

The analysis of the results of the questionnaire will be organized under six headings: (1) goal formulation process, (2) role perceptions, (3) advisory relationships, (4) science as a political issue area, (5) science, politics, and the public, and (6) atomic energy and defense. The account here will be in narrative form. References to specific questions will be made by (no.). The questionnaire is provided in full in appendices.

Goal formulation process There is agreement generally among all three respondent groups of Japanese scientists and the goups of political decisionmakers that the primary goal of the atomic energy program should be to provide cheap electric power rather than to achieve an independent atomic energy capability (no. 8). Social scientists (77%), and physical scientists

(74%), decisionmakers (68%) and atomic scientists (62%) all felt the primary emphasis should be in this direction. Still, it must be noted that slightly under a quarter to somewhat over one-third of each group would argue that economic considerations of electrical production should be secondary to basic research and development.

This debate over relative priorities has continued since the atomic energy development program was first outlined in the mid-1950s and, as was explained in Chapter III, involves highly complex questions such as the degree to which Japan should be dependent on imported technology, the cost effectiveness of developing several types of reactors simultaneously, and strategic implications of the nuclear fuel cycle. The atomic scientists have continually advocated long-range research programs to complement the immediate development of electrical power generation. It is to be expected that they will continue to articulate demands for a broad program of basic atomic research in the future.

All four groups of respondents tended to view the relative influence of the major bureaucratic actors in the policy formation process in a similar perspective. The Japan Atomic Energy Commission and the Atomic Energy Bureau of the STA were rated as having a "high" degree of influence on atomic energy policymaking in all cases. The Japan Science Council and the Science and Technology Council were rated as having a "low" degree of influence by all respondents, with one exception. Forty-one per cent of social scientists rated the STC as having a "high" degree of influence, much higher than atomic scientists (9%), physical scientists (25%), or decisionmakers (12%). MITI was rated as having a "high" degree of influence by a majority of all groups except physical scientists (19%), and overall, MITI was perceived as falling slightly behind the JAEC and the Atomic Energy

Bureau in the influence it exerts on atomic energy policy formation. The Science and Technology Promotion Committee in the Diet was given a "moderate" to "high" rating overall, but tended to be perceived as more important by decisionmakers and less important by atomic scientists. The Prime Minister's Office, an administrative unit housing the Science and Technology Agency and other such diverse bodies as the Defense Agency, Economic Planning Agency, and the National Public Safety Commission, was seen generally as having a moderate degree of influence over the policymaking process. However, both atomic scientists and decisionmakers, and especially the latter, tended to mark it farther down the scale.

Communication links between the four groups of scientists and decisionmakers, as indicated by the results of the questionnaire, are relatively infrequent (nos. 1,2). This is especially true of linkages between the scientific community and political decisionmakers. Ninety-two per cent of social scientists and 69 per cent of the non-atomic energy physical scientists reported that they never communicate with atomic energy policy decisionmakers. Even 47 per cent of atomic scientists say they never speak with or write to their political counterparts. The only divergence from this pattern is in the case of the decisionmaker group, 68 per cent of which indicated contact with atomic scientists on a weekly or daily basis. Another 21 per cent reported they have contact with atomic scientists approximately once a month. In the reverse case (atomic scientist contact with decisionmakers), 46 per cent said they have written or verbal contact with atomic energy policymakers at least every six months. Only 6 per cent reported daily or weekly contacts, however.

Communication linkages within the scientific community are more frequent than between scientists and decisionmakers. Fifty-one per cent of social scientists reported contacts with atomic scientists at least every six months, and five per cent on a daily basis. Of the physical scientists, 48 per cent communicated with atomic scientists at least every six months, none on a daily basis. However, 44 per cent of social scientists and 29 per cent of physical scientists reported no contact at all with scientists working on atomic energy related projects.

As was noted earlier, the Japanese decisionmaking system appears to rely to a considerable extent on informal processes of negotiation and consensus seeking for resolving differences of opinion on policy issues. While the opportunity for confrontation between scientists and policymakers is afforded through formal associations like the Japan Science Council and various *ad hoc* groups, the opportunity for informal negotiation would seem to be much less in view of the lack of frequent and continuous communication linkages between scientists and decisionmakers on atomic energy policy.

Role perception Both Japanese scientists and political decisionmakers recognize that there is much more agreement on atomic energy development policy among decisionmakers than among scientists (nos. 3,4). Japanese decisionmakers feel particularly strongly that scientific views are in "strong opposition to each other" (67%), and that decisionmaker's views are closely similar (85%). Social scientists saw the most similarity of views among scientists (28%), followed by the atomic scientists (21%). Of the four groups, the atomic scientists opinions were the most mixed in describing the attitudes of scientists generally on atomic energy policy. Twenty-one per cent of atomic scientists felt scientists' attitudes were closely similar, 47 per cent felt they were strongly opposed, and 29 per cent felt no overall relationship was discernible.

Decisionmakers and social scientists tended to see the greatest opposition of views on atomic energy policy among Japanese scientists, and they also saw the greatest similarity of views among Japanese decisionmakers (85% and 62% respectively). Many atomic scientists felt that decisionmakers' views could not be classified as strongly similar or strongly opposed (37%) any more than scientists' attitudes could be so classified (29%). A plurality of physical scientists felt that scientists' views were strongly opposed (46%) and decisionmakers' views were closely similar (47%); however, in both cases there was a high "no opinion" response (20% and 29%).

The relationship between Japanese scientists and political decisionmakers in the atomic energy policymaking process, (no. 5), was felt to be "generally cooperative" by both atomic scientists and decisionmakers (42% and 57% respectively); social scientists (60%) and physical scientists (42%) saw the relationship as "generally antagonistic." A number of atomic scientists (36%), physical scientists (31%) and decisionmakers (25%) felt there was no overall cooperative or antagonistic relationship between scientists and decisionmakers. Only 18 per cent of social scientists felt this way.

Both scientists and political decisionmakers agreed overwhelmingly that scientists "understand the political implications of their scientific research and development," and a majority of social scientists (62%), decisionmakers (54%), and atomic scientists (51%) further felt that scientists are "willing to take political issues into account when they formulate their research goals and methods" (no. 6). However, whereas political decisionmakers felt quite confident that they understood the "significance for scientific research and development of their political acts," scientists were much less inclined to agree. Moreover, while decisionmakers felt they were willing "to take these" scientific "implications into account when formulating political decisions," the scientists were considerably less confident that they, in fact, did so (no. 7).

Scientists and decisionmakers both expressed confidence in scientists' ability to understand the political implications of their work (decisionmakers 85%, social scientists 83%, atomic scientists 83%, and physical scientists 80%). Sixty-two per cent of social scientists were convinced that scientists did, in fact, take political considerations into account in their research. Fifty-four per cent of decisionmakers agreed, although 31 per cent felt that while scientists might understand the political implications of their work they did not take such factors into account when formulating their research goals and methods. Atomic scientists (32%) and physical scientists (33%) were even less convinced that scientists took political considerations into account in their research.

Seventy-eight per cent of Japanese political decisionmakers responding to the questionnaire felt that decisionmakers generally understood the impact their political acts would make on scientific research and development, and 63 per cent said this group took such factors into account when making decisions. Japanese scientists disagreed. Only 32 per cent of social scientists, 30 per cent of atomic scientists, and 46 per cent of physical scientists felt decisionmakers understood the significance of their political acts. Eighteen per cent of atomic scientists and 23 per cent of physical scientists believed decisionmakers took these factors into account in policymaking; only 3 per cent of social scientists thought so. In other words, while 63 per cent of decisionmakers felt their perceptions did positively influence their acts, 82 per cent of atomic scientists, 77 per cent of physical scientists, and 97 per cent of social scientists agreed that decisionmakers' perceptions of the effects their acts would have on science did not positively influence those acts, either because of the decisionmakers' inability to understand such scientific implications or because of unwillingness to take them into account.

As a test of how effective Japanese scientists and political decisionmakers perceive each other to be in planning for anticipated changes in environmental factors that affect policy implementation, the respondents to the questionnaire were asked to rate the ability of both scientists and decisionmakers in predicting both political conditions and changes that science and technology would bring about over the next thirty years (nos. 34, 35, 36, 37). The scientists were rated "moderately well" by a majority of all groups for predicting changes brought about by science and technology (physical scientists 62%, atomic scientists 55%, social scientists 54%, and decisionmakers 52%). Social scientists were most pessimistic in this regard; 26 per cent felt that scientists' predictive capabilities rated "poor" as compared to the general public.

The perceived ability of scientists to predict changing political conditions (no. 34) was considerably lower, although the social scientists and physical scientists both had more confidence in scientists' political acumen (34 per cent and 44 per cent, respectively, rating them "moderately good") than did the atomic scientists (18%) or political decisionmakers (22%). By and large, neither decisionmakers nor the scientists themselves credited scientists with any significant prescience in politics. They were rated as "average" or "poor" by 78 per cent of decisionmakers, 81 per cent of atomic scientists, 66 per cent of social scientists, and 56 per cent of physical scientists.

Few scientists gave political decisionmakers any credit for special foresight in either the scientific (no. 37) or political spheres (no. 35).

The atomic scientists gave decisionmakers the best ratings. Twenty-four per cent rated decisionmakers "moderately well" or "very well" on the science and technology scale and 32 per cent "moderately well" or "very well" on the political. Social scientists were consistently negative in their perceptions of political decisionmakers' abilities, giving them a "moderately well" rating of 13 per cent for political predicting and 15 per cent for scientific predicting, but a 68 per cent "poor" rating for politics and a 64 per cent "poor" rating for science.

Political decisionmakers rated their own abilities to predict political trends (no. 35) as "very good" or "moderately well" more than twice as often as did the scientists overall (52% versus 23%), and their abilities to predict scientific changes as "very good" or "moderately well" nearly two and a half times as often as did the scientists (47% versus 19%). Conversely, social scientists and physical scientists perceived scientists' ability to predict political changes as better than political decisionmakers' abilities in this regard.

One may summarize the findings on the mutual role perceptions of Japanese scientists and decisionmakers as follows. First, all groups agree that the views of political decisionmakers on atomic energy policy are much more similar than are the views of scientists. Second, the relationships between scientists and decisionmakers in the atomic energy policymaking process is rated as much more cooperative by those most closely involved in it (atomic scientists and atomic energy decisionmakers) than by those with more tenuous contacts (social scientists and physical scientists). There is no way to explain this sharp divergence of views from the results of this questionnaire, although one possible explanation might be that the latter base their perceptions primarily on the more open, formal confrontation process while the former view the relationship from a more intimate, informal and consensus-seeking perspective. Third, there is general agreement that scientists understand the political implications of their scientific work. Opinions are mixed as to whether they take political issues into account when formulating scientific research goals and methods. However, while political decisionmakers felt that they as a group do understand the implications of political acts for scientific development programs, in the opinion of the majority of scientists they do not. Many fewer scientists felt that decisionmakers took such factors into account when they acted. Here again, decisionmakers' perceptions of themselves conflicted with the scientists' perceptions of them.

Fourth, neither group credited either scientists or decisionmakers with any outstanding prescience in either political or scientific developments. A little over half of every group credited scientists with a moderately good ability to predict scientific trends. Abilities to predict political trends were rated generally as only average or poor. Fifth, both scientists and decisionmakers perceived their own abilities along these lines more favorably than they did those of the other group. Some scientists felt their ability to predict political trends was even better than that of political decisionmakers, and they rated themselves much higher on this score than did the decisionmakers. Decisionmakers perceived their own abilities in predicting both political trends and scientific changes to be much better than did scientists.

Advisory relationships The initiative in the advisory relationship between Japanese scientists and Japanese political decisionmakers is with the decisionmaker. All four groups of respondents clearly felt that the political decisionmaker was the one who made decisions, and not the scientific advisor (no. 11). This was especially true in the perceptions of social scientists (89%) and decisionmakers (88%). Atomic scientists and physical scientists (73% and 74% respectively) tended to feel this less strongly, possibly because of the more technical nature of such advice in fields in which the decisionmaker seldom feels competent himself.

In selecting scientific advisors, a majority of scientists in all three groups agreed that the opinion of the scientific community should be relatively more important than that of the decisionmaker (no. 13). The social scientists felt this most strongly (84%), the physical scientists somewhat less so (62%), and the atomic scientists still less (54%). However, all of these gave considerably more weight to the opinion of the scientific community than did the decisionmakers, of which only 16 per cent felt it should predominate. Most decisionmakers preferred an equal weighting of opinion (54%), while 31 per cent felt that "the opinion of the political decisionmaker should be somewhat more important than the opinion of the scientific community." Out of all scientists the atomic scientists leaned most clearly to the opinion of the decisionmakers; 35 per cent favored equal weighting of opinion and 10 per cent felt the decisionmakers' opinions should take precedence.

All groups of respondents agreed that Japanese decisionmakers' opinions were more influential in actually selecting scientific advisors for the atomic energy program in Japan than the respondents felt such opinions should be (no. 14). While practically no scientists felt the opinions of the decisionmakers <u>should be</u> the "most important factor" in selecting scientific advisors, in the case of actually choosing Japanese atomic energy advisors 63 per cent of social scientists, 49 per cent of physical scientists, 34 per cent atomic scientists, and 19 per cent of decisionmakers felt the decisionmakers opinion was <u>in fact</u> the most important consideration. Only 20 per cent of physical scientists, 11 per cent of decisionmakers, 8 per cent of social scientists, and 8 per cent of atomic scientists felt scientific opinion took precedence over the decisionmakers' opinion to any degree.

When asked to what extent they believed that "a political decisionmaker should make the political beliefs of scientists a criterion for selecting his scientific advisors," half of the decisionmakers replied that political beliefs should not be considered in choosing scientific advisors (no. 15). Scientists agreed strongly with this point of view (physical scientists 71%, social scientists 70%, and atomic scientists 59%). All four groups also felt that the political beliefs of scientific advisors should differ from one another (decisionmakers 46%, atomic scientists 39%, social scientists 30%, and physical scientists 29%). Only 3 per cent of atomic scientists and 4 per cent of decisionmakers felt that a decisionmaker should select only advisors whose political beliefs were similar to the decisionmaker's own.

When scientific advisors disagree on the correct advice to give a decisionmaker on a particular problem, all four groups tended to feel that the initiative should then be with the decisionmaker (nos. 12, 16). Decisionmakers felt this most strongly and social scientists least strongly. For example, 84 per cent of decisionmakers felt that when scientific advisors disagree on the correct advice to give they should state their different opinions and leave the decision up to the decisionmaker (no. 12). Likewise, when faced with conflicting advice, decisionmakers (81%) felt the best solution was for the decisionmaker to "take all scientific opinions into account and then decide on the basis of which seems best suited to his own policy goals" (no. 16).

Atomic scientists and physical scientists tended to support this approach to policymaking. Sixty-eight per cent of atomic scientists and 56 per cent of physical scientists agreed that scientists should state their differences and leave further action to the discretion of the decisionmakers, and they supported the principle that the decisionmaker should pursue his policy goals as he sees fit if there is no clear agreement among his scientific advisors (atomic scientists 75%, physical scientists 53%). A plurality of social scientists supported this approach, 43 per cent of them in the former case and 38 per cent in the latter.

A sizeable number of social and physical scientists also felt that in cases of conflicting scientific opinions, scientific advisors should "give no advice until they can agree" (social scientists 37%, physical scientists 29%). Only 15 per cent of decisionmakers and 16 per cent of atomic energy scientists agreed with this idea. Nearly one-third of social scientists also felt a decisionmaker should not act in the face of conflicting advice, but should wait "until there is agreement among all advisors." Only 17 per eent of physical scientists found this postponement of action advisable for decisionmakers, whereas 29 per cent of them felt that scientific advisors should withhold advice until they were in agreement. Only 7 per cent of atomic scientists felt a decisionmaker should wait for agreement among his advisors. Twelve per cent of decisionmakers felt a decisionmaker should withhold action until scientific consensus is reached.

Arriving at a statement of views by majority vote was clearly unacceptable for most of the Japanese respondents. Decisionmakers completely ignored this possibility either as a means of resolving disagreement among advisors or as a guide for policy action by a decisionmaker. Only 8 per cent of atomic scientists recommended a decisionmaker act on a majority vote, and only 5 per cent recommended it as a means of reaching a consensus among scientific advisors. A larger percentage of social scientists and physical scientists felt it was preferable for a decisionmaker to act on the basis of majority advice (14% and 22% respectively) than for scientists to "give only the opinion of the majority and not state their different opinions" to the political decisionmaker (3% and 12% respectively).

In summary, the responses to this series of questions on the advisory relationships between Japanese scientists and decisionmakers show a clear predominance of the political decisionmaker over the scientific advisors. All respondents acknowledged the leadership of the decisionmaker's setting policy on scientific and technical issues. They also agreed that the decisionmaker's opinion predominated in selecting advisors, even though all groups professed they felt his voice should be not so strong as it is in practice. The respondents believed science advisors should be selected without regard to their political beliefs, but to the extent that political beliefs are a consideration, scientists should represent a broad spectrum of political opinions.

Science as a political issue All groups of respondents agreed, by sizeable majorities, that when there is "political controversy over the goals and priorities of scientific research and development," society gains "because such debate helps scientists to determine the most socially beneficial projects to which they can devote their talents." (No. 10). All groups agreed, too, although by somewhat less sizeable majorities, that "it is the responsibility of a scientist to engage in policy discussions and political decisionmaking when it affects his scientific work" (no. 9).

Social scientists, by far, expressed the strongest feelings that science has political responsibilities; 95 per cent of them believed that society benefits from political controversy over scientific goals, while 92 per cent of them felt a scientist has a responsibility to engage in political debates which touch upon his scientific work. Atomic scientists and decisionmakers were almost identical in their reactions; 87 per cent of atomic scientists and 86 per cent of decisionmakers felt that "society benefits from political controversy over science," while 75 per cent and 76 per cent respectively felt that "a scientist has a responsibility to become involved in science policy debates . . . ." Physical scientists were the least united in their viewpoints; 67 per cent believed political controversy over science benefits society, while 60 per cent felt scientists should join in such political controversy.

While all groups of respondents tended to support the idea that scientific research and development should be responsive to political considerations, only the social scientists gave majority support to the proposition that atomic energy "should be an issue in elections" (no. 40). Over two-thirds of decisionmakers (68%) felt that atomic energy policies should not be election issues, while atomic scientists and physical scientists were less firm in their attitudes, although majorities of both (60% of atomic scientists, 55% of physical scientists) felt atomic energy should not become an electioneering topic.

There does not appear to be any consensus on the question of the "level of interest in domestic political issues among Japanese scientists" (no. 38). Approximately one quarter of the scientists polled felt that scientists' interest in politics was either "high" or "low" while approximately half of each of these same groups of scientists felt scientists' political interest was "medium". Decisionmakers were the most divided in their opinions; 41 per cent rated scientists as having a "moderate" interest in politics, and the rest split, rating them as having either a "high" or "low" level of interest. These results would seem to suggest that participation in domestic political debate by Japanese scientists is selective and varies widely from case to case.

Opinion as to the importance "Japanese political decisionmakers attach to atomic energy research and development" also varied (no. 39). However, atomic scientists rated decisionmakers lower than did the other three groups, while social scientists and physical scientists rated decisionmakers interest toward the upper end of the scale. Only 30 per cent of atomic scientists felt decisionmakers attached "very much" importance to atomic energy; 68 per cent of social scientists and 60 per cent of physical scientists felt so. Fourteen per cent of atomic scientists also rated decisionmakers as having "very little" interest, while only two or three per cent of each of the other three groups did so. Atomic energy decisionmakers were more optimistic in their perceptions of the importance decisionmakers as a whole attached to atomic energy; 96 per eent split evenly, rating it as either "very much" or "moderate".

Overall, the results of this portion of the questionnaire suggest that Japanese scientists and decisionmakers accept the value of political controversy over science programs and, to a somewhat lesser degree, feel that scientists should take part in such political discussions. Social scientists are most committed to these premises, and decisionmakers, atomic scientists, physical scientists somewhat less, but still significantly so. The electoral process is not considered by any except the social scientists to be a particularly effective way of carrying out this political discussion, least of all by political decisionmakers. The pattern of perceptions of Japanese scientists as political actors is unclear, although roughly half of all the total respondents would rate scientists' interest in political issues as moderate. Perceptions of the importance that political decisionmakers attach to atomic energy development are also mixed. However, the fact that there is an inverse correlation between the degree to which decisionmakers are perceived to attach importance to atomic energy research and development on the one hand, and the presumed professional and personal commitments to the success of programs on the other, suggests that competition over resource allocations and research priorities within the decisionmaking framework may be more significant in accounting for these differences of perceptions than differences of opinion on more fundamental political or social issues.

Science, politics, and the public The issue of public participation in the political decisionmaking process has recently attracted much attention in Japan, and the government has indicated its willingness to adjust the policymaking process to include more input from groups representing various segments of the public at large. The responses to two items on this questionnaire suggest that there are a considerable number of individuals connected with the atomic energy program who may question the efficacy of this approach to policymaking (nos. 28, 29). Only social scientists (79%) strongly supported public participation in decisionmaking (no. 29). Atomic scientists and physical scientists were about evenly divided in their attitudes (atomic scientists: 49% Yes and 42% No; physical scientists: 47% Yes and 47% No). Half of the decisionmaker group did not support participation by public interest groups; 27 per cent did support such participation and 23 per cent were undecided.

Closely associated with the issue of citizen participation in decisionmaking is the question of public access to sufficient information so as to enable them to engage in informed debate. Social scientists and physical scientists both felt the public did not have readily available information (71% and 74%, respectively). Since social scientists strongly support public participation in decisionmaking, but at the same time feel that adequate information is lacking, they could reasonably be expected to support proposals to broaden the scope of information open to the public. Decisionmakers tended to feel the public did have adequate information (63% Yes, 37% No). Atomic scientists were divided in their opinions (42% Yes, 54% No).

In dealing with the growing public opposition movement to atomic energy development in Japan, atomic scientists (62%), decisionmakers (64%) and physical scientists (50%) tended to feel that education is the best approach (no. 36). As noted earlier in this study, the atomic energy community has been expanding its public relations campaign steadily in recent years. Evidently, many scientists and decisionmakers feel this will be sufficient to assuage citizens' fears. While only 18 per cent of decisionmakers viewed participation by civil interest groups as the best way to deal with public opposition, scientists were more receptive to such an idea (social scientists 39%, physical scientists 28%, and atomic scientists 27%). The only group which in any sizeable number suggested cancelling projects as the best answer to public opposition was the social scientists (37%); 19 per cent of the physical scientists also favored this approach.

Opinion was somewhat less divided on the specific question of opposition to power plant sitings (no. 30). A majority of each group indicated they favored cancelling plans for an atomic power plant in a particular area if the residents of the area expressed strong opposition to the plant through a vote or opinion poll (social scientists 84%, decisionmakers 63%, physical scientists 52%, atomic scientists 50%). However, a considerable number of physical scientists (33%), atomic scientists (30%) and decisionmakers (29%) also opposed cancelling power plant sites on these grounds.

In general, the responses given by decisionmakers in this section of the questionnaire indicated their conception of citizen group participation in the political process is a relatively limited one. Half of them definitely reject the idea of public groups participating in political decisionmaking; 68 per cent felt that atomic energy issues should not be made election issues, 64 per cent would deal with opposition movements primarily through educating the public, and 63 per cent indicated they felt the public already has adequate information on atomic energy issues. Social scientists contradicted these attitudes on every point. They supported public interest group participation (79%), felt atomic energy issues should be part of the electoral process (72%), would encourage interest group participation (39%) or would halt projects (37%) when faced with citizen opposition, and they did not feel that the information presently available to the public is adequate for rational discussion of atomic energy questions (71%). Atomic scientists and physical scientists tended to support decisionmakers' attitudes that education is the best way to deal with public opposition in general (62% and 50% respectively), and they agreed that atomic energy policy is not a subject for debate during elections. On the question of supporting participation by public interest groups, both the atomic and physical scientists split down the middle. Atomic scientists were also fairly evenly divided on the question of whether the public has sufficient information available to make informed judgments at this time. Physical scientists (74%) agreed with social scientists that they do not.

Atomic energy and defense There appeared to be considerable variation of opinion among respondents as to where Japan's atomic energy development program should rank as compared to seven other countries with atomic energy programs (no. 33). Except for the United States and the Soviet Union which were rated well ahead of Japan, ratings over a five-point scale (from "much more advanced" to "much less advanced") varied widely, especially in the case of China. Generally speaking, aatomic scientists and decisionmakers tended to rate other countries more highly as compared to Japan than did the social scientists or physical scientists. However, in the case of China, atomic scientists' and decisionmakers' ratings were much lower than were social scientists' or physical scientists' ratings. Many variables, including distinctions between military programs and civilian development, judgments colored by political attitudes, and differences between the state of basic research and practical reactor application undoubtedly accounted for the wide variation in the perceived state of atomic energy development in Japan and in foreign countries. It is, however, an indication of the lack of agreement on the role atomic energy should play in Japan, that in spite of the sizeable investment that has already been made and is currently being planned for research and development, and in spite of the fact that Japan is to be relying increasingly on atomic technology for her national energy supply, there is as yet no clear perspective on Japan's overall success in this field.

On the question of how Japan can best meet her national security needs as a non-nuclear-weapon state, all groups of respondents consistently expressed a preference for a multilateral approach to defense guarantees. There does not appear to be any significant support for the thesis sometimes proposed that global stability can best be attained through multiple, mutually balancing national nuclear forces (no. 17). A majority of each group surveyed, especially decisionmakers, felt that nuclear proliferation was basically destabilizing (decisionmakers 85%, atomic scientists 68%, physical scientists 56%, and social scientists 53%).[1] There was also little unqualified belief in the American nuclear umbrella as a reliable shield from outside attack (no. 23). The most faith in the American deterrent was expressed by the physical scientists (31%) and decisionmakers (27%). Among atomic scientists and social scientists the American nuclear umbrella appeared particularly unreliable. Only 14 per cent of atomic scientists and 3 per cent of social scientists found it a credible basis for Japan's nuclear defense. Approximately one-quarter of all respondents felt that the United States would fire its nuclear weapons against a state which attacked Japan with nuclear weapons, if the aggressor state also attacked the United States with nuclear weapons. There was a sizeable element of each group which felt the United States would never fire nuclear weapons at another state to protect Japan (social scientists 44%, atomic scientists 28%, physical scientists 26%, and decisionmakers 19%).

All groups of respondents expressed strong preferences for meeting the problems associated with atomic energy, both peaceful and military, on a global level (no. 27). The international level, as opposed to the national or regional level, was selected as the most appropriate one by 88 per cent of social scientists, 84 per cent of physical scientists, 75 per cent of atomic scientists, and 72 per cent of decisionmakers. Likewise, there was also very favorable reaction, especially among the scientists, to the suggestion of a denuclearized zone in Northeast Asia, guaranteed by the major world powers, within which all manufacture, importation or use of

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[1]A number of scientists provided written comments in the "Other" space provided. Nearly all of these said nuclear weapons should be completely eliminated, or words to that effect.

nuclear weapons would be prohibited (no. 25). Ninety-three per cent of atomic scientists, 83 per cent of social scientists, 79 per cent of physical scientists, and 52 per cent of decisionmakers supported such a concept, although decisionmakers appeared to hold more reservations and gave "No opinion" 28 per cent of the time.

In one area of international application of atomic energy, there was considerable difference of opinion both between and within groups of respondents. No consensus seems to have been reached in the scientific community in Japan on the question of using nuclear explosions for peaceful purposes (no. 26). Social scientists split into three nearly equal groups favoring either the development of Japan's own explosive devices (31%), the use of devices controlled by the IAEA or some similar international agency (36%), or the rejection of nuclear explosions by Japan for any purpose whatsoever (33%). Physical scientists were grouped similarly with 35 per cent favoring devices controlled directly by Japan, 29 per cent supporting internationally controlled devices, and 29 per cent refusing to consider Japan's use of nuclear explosions, peaceful or otherwise. Atomic scientists were also divided between using IAEA or other internationally controlled explosive devices (44%), or rejecting the use of such devices altogether (33%). A smaller group (18%) suggested that Japan should control its own devices. A majority of decisionmakers felt Japan should take advantage of peaceful explosion technology through the IAEA or other international channels (54%), while 36 per cent favored developing Japan's own peaceful devices. Only 4 per cent of decisionmakers rejected the idea of using peaceful nuclear explosions altogether, while approximately one-third of scientists took this stand. On one point all groups were in agreement. Japan should not seek to utilize explosive devices controlled by other countries.

By sizeable majorities, all groups agreed that Japan would never need nuclear weapons (no. 18). Social scientists (97%) and atomic scientists (89%) felt this most strongly, with physical scientists (74%) and decisionmakers (68%) less so. Twenty-four per cent of physical scientists and 29 per cent of decisionmakers felt Japan would need nuclear weapons if there was widespread nuclear proliferation. Only atomic scientists were fairly confident, however, that Japan would, in fact, never acquire nuclear weapons (no. 24). Seventy per cent of atomic scientists felt Japan would never acquire nuclear weapons, but only 58 per cent of social scientists, 56 per cent of decisionmakers and 47 per cent of physical scientists. Of those in each group who felt that Japan would eventually "go nuclear," the great majority were unable to estimate within what time frame.

All groups overwhelmingly (by 88% to 92%) supported IAEA inspections of peaceful atomic energy facilities (no. 19). Most scientists also agreed that in a country where IAEA inspectors were at work, each individual would have a personal responsibility (or, as a number of respondents commented, a duty as a citizen) to report suspected violations of nonproliferation agreements to the international inspector (no. 21). Social scientists (89%) and physical scientists (79%) supported this concept of personal responsibility most strongly, atomic scientists less strongly (63%), and decisionmakers only by a plurality (46%). The decisionmaker group was most strongly opposed to individuals reporting to international inspectors (33%), while many decisionmakers (21%) and atomic scientists (21%) expressed no opinion. A majority of scientists also supported making it a legal responsibility to report suspected violations to international inspectors (no. 20), but there was less agreement on the prospect of a legal responsibility than on the concept of individual responsibility (social scientists 76%, atomic scientists 61%).

Decisionmakers were about evenly divided between those supporting legal responsibility (42%) and those opposing it (38%). Twenty-one per cent of decisionmakers expressed no opinion.

In spite of their apparently internationalist orientation on atomic energy matters and their willingness to accept international inspection, a good deal of doubt was expressed on the Nonproliferation Treaty by Japanese scientists (no. 22). Only 48 per cent of social scientists, 43 per cent of atomic scientists, and 42 per cent of physical scientists felt that the NPT should be ratified as it now stands. Sixty-two per cent of decisionmakers favored ratification, however. Approximately one-third of the respondents rejected ratification of the NPT (atomic scientists 37%, decisionmakers 35%, physical scientists 30%, and social scientists 27%), while a number of scientists expressed "No opinion" (physical scientists 27%, social scientists 24%, and atomic scientists 19%).

Overall, the respondents appeared to agree that nuclear proliferation would be destabilizing for the world political community. They rejected nuclear weapons under Japanese control as an effective defense strategy, and they also questioned the credibility of the American nuclear umbrella. They are less confident that nuclear weapons will never be taken up by Japan in the future. In both the peaceful and military application of atomic energy, the respondents felt that solutions to problems must be found on the international level. From the standpoint of defense, all would seem to favor the inclusion of Japan in a demilitarized zone in Northeast Asia. On the issue of Japan's peaceful development program, all groups of respondents would support IAEA inspections. Although scientists as a group generally support the concept of a legal and personal (or citizen) responsibility to report suspected violations to inspectors, decisionmakers are less apt to do so. The two issues which elicited the greatest divergence in opinions, both between respondent groups and within them, are those concerning the prospective use of atomic explosions for peaceful purposes and ratification of the NPT.

Perception as a Planning Input

<u>Perceptual dissonance</u> The pattern of attitudes which appear in the responses to this questionnaire are of interest primarily from the standpoint of policy planning in that they are an indication of the configuration and intensity of potential political demands. If the policymaking process is to be responsive to inputs from a variety of political interests, and if policies are to be formulated in terms of the impact they are expected to have on "partisan" groups within the society, it is important to know how these groups within society feel about those policy areas and how intensely these attitudes are held. The degree to which political attitudes within particular social groups are well formulated or not well formulated is one indication of the impact a specific policy output will have on those groups. Likewise, the extent to which the attitudes of one social group reinforce or counterbalance the attitudes of other groups is an indication of the impact policy outputs will have on the larger societal environment. Perceptual dissonance is a way of showing this attitudinal relationship between societal groups. Perceptual dissonance is found by measuring the spread between the percentage of individual responses in different groups that select the same response to identical questions. Thus, if 65 per cent of individuals in group A answer "Yes" to question "X" and 35 per cent of individuals in group B answer "Yes" to question "X", the perceptual dissonance between both groups is thirty. The measurement is one of space between groups of responses rather than groups of responses themselves.

Three basic classes of responses can be identified. These are shown on the next page as Case no. 1, Case no. 2, and Case no. 3.

TABLE 9

PERCEPTUAL DISSONANCE: HYPOTHETICAL CASES

Case no. 1			Case no. 2			Case no. 3		
	A	B		A	B		A	B
Yes	10%	90%	Yes	90%	90%	Yes	45%	55%
No	90%	10%	No	10%	10%	No	55%	45%

In Case no. 1, attitudes within both groups are strongly held (i.e., attitudes are intense) and there is a high degree of inter-group perceptual dissonance. Various inferences could be made from such an attitudinal pattern, depending on the particular circumstances of the individual situation. Generally, though, one would expect that both groups would be united internally in their attitudes and that their interests would be readily articulated. These articulated intra-group interests would most likely clash in the inter-group environment, however. In Case no. 2, there is a high degree of intra-group attitudinal intensity coupled with a low degree of perceptual dissonance between groups. Individuals within each group are largely in agreement in their perceptions, and both groups' perceptions are in agreement on an overall extent. Thus it can be expected that both groups could readily articulate their interests and that these articulated interests would tend to support each other. In Case no. 3, the intensity with which intra-group attitudes are held is quite low, and there is a low degree of inter-group dissonance. In other words, both groups tend to be divided down the middle in their perceptions of a particular issue. In this situation one can infer that neither group could readily articulate their interests. Should either or both achieve success in decreasing the degree of intra-group dissonance through some consensus seeking procedure, the degree of inter-group dissonance could lessen (if both groups move in the same direction toward a consensus at either end of the spectrum), or widen (if both groups move in opposite directions toward a consensus, or if one group intensifies its attitude position and the other remains the same).

It should be noted that perceptual dissonance is a measurement only of the spread of attitudes within a group. It does not imply that any particular political action will follow as a result of changing perceptions. Its utility lies in the perspective it can provide planners who are scanning a particular issue to identify points where there exists strong agreement among actual or potential actors, points where there exists strong disagreement, or areas where little consensus exists. Its usefulness as a planning guide is in direct proportion to the degree to which attitudinal inputs are solicited from all groups that will feel the impact of any particular policy decision.

The perceptual pattern The perceptual differences between each of the four groups of respondents were calculated for each of the six atomic energy policymaking areas included in this questionnaire. This provides a perceptual dissonance matrix with thirty-six entries as shown on the next page.

On an overall basis, taking the total numbers of responses by all groups of respondents to the questionnaire, the perceptual differences between the four groups of respondents and the perceptual differences among respondents with reference to the six attitude categories in the questionnaire are also shown.

Clearly, social scientists as a group account for the greatest amount of perceptual differences both within the scientific community and between scientists and political decisionmakers. Atomic scientists on the other

TABLE 10

PERCEPTUAL DISSONANCE BY GROUPS OF RESPONDENTS AND CATEGORY OF ATTITUDE

	SS-AS	SS-PS	SS-DM	AS-PS	AS-DM	PS-DM
The public as a political actor	19.8	16.1	25.0	7.4	10.0	14.6
Science as a political issue-area	15.9	18.7	16.5	12.6	7.8	11.1
Role perceptions	14.3	12.3	20.0	8.8	11.6	15.0
Advisory relationships	13.9	10.9	19.7	10.4	9.1	17.2
Goal formulation process	11.7	10.1	14.8	14.4	10.8	17.4
Atomic energy and defense	9.7	8.9	16.3	10.1	10.8	11.8

PERCEPTUAL DISSONANCE BETWEEN GROUPS OF RESPONDENTS AND BETWEEN CATEGORIES OF ATTITUDE

Groups of Respondents	Perceptual Dissonance
Social scientists-Decisionmakers	18.7
Social scientists-Physical scientists	14.5
Physical scientists-Decisionmakers	14.5
Social scientists-Atomic scientists	14.2
Atomic scientists-Physical scientists	10.6
Atomic scientists-Decisionmakers	10.0
Categories of Attitude	
The public as a political actor	15.4
Science as a political issue-area	13.7
Role perceptions	13.6
Advisory relationships	13.5
Goal formulation process	13.2
Atomic energy and defense	11.2

hand, appear to have the lowest degree of perceptual differences with other groups. Their perceptual affinity to the decisionmaking group is, of course, explained to some extent by the fact that the decisionmakers in this sample were associated specifically with atomic energy policymaking. It may be questioned whether the perceptions of atomic scientists would be as close to the total population of Japanese decisionmakers as they were to this select group, or whether the dissonance between decisionmakers in general and social and physical scientists might be less than in this case. Further polling would be required to test such a proposition.

Perceptual dissonance between all four groups was highest on those questions relating to the public as a political actor (nos. 28, 29, 30, 31). Social scientists and decisionmakers were especially far apart in their attitudes toward the participation of citizen groups in policymaking, the former being strongly in favor and the latter opposed. Social scientists also disagreed with the three other groups on how best to deal with citizen opposition to atomic energy development. Social scientists favored encouraging participation or halting projects the public opposed, while the others strongly preferred to rely on educating the public. Such questions can be expected to continue to arise as atomic power plants proliferate throughout populated areas. The issue of public safety can be expected to strain further the ties holding together the Japanese scientific community, as the social scientists help to articulate public fears and atomic scientists rally to their professional standard.

Nakayama Ichiro, Vice President of the Japan Science Council, remarked a number of years ago that modern society offers many opportunities for scientists to make "political statements" because of the many effects that technological change has on the daily life of the average citizen. Opportunity has not been enough, as Nakayama observed at the time, to ensure a free flow of intellectual stimuli between the scientific community and the political system in Japan, because too often political leaders seem "insincere" in seeking scientific input while scientists can appear "irresponsible" in their political remarks.[1]

In this questionnaire, social scientists' perceptions of the relationship between science and politics (nos. 9, 10, 38, 39, 40) varied much more widely as a group than did those of the other three groups of respondents. While all groups agreed in general that society benefits from political controversy over scientific research and development, and that scientists have a responsibility to engage in such political debate, social scientists felt this much more strongly. Social scientists also strongly disagreed with the other groups on the advisability of making atomic energy an election issue. The same pattern emerges here as in the case of the public role in decisionmaking, with social scientists favoring politicization of administrative policy procedure to a much greater extent than other groups. Decisionmakers and atomic scientists appear to be the most conservative in this respect, and while they appreciate the interrelationship of science and policymaking, prefer to keep it on a higher, "non-political" level.

On role perception questions (nos. 3, 4, 5, 6, 7, 34, 35, 36, 37) the greatest perceptual dissonances occurred between social scientists and decisionmakers, and between physical scientists and decisionmakers. Basically this was due to the rather critical attitude of scientists toward decisionmakers' roles in science policy formulation. Where decisionmakers saw the overall relationship between scientists and decisionmakers as generally cooperative, and felt that decisionmakers as a group appreciated the effect

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[1] Yomiuri Shimbun, Oct. 29, 1958 in DSJP, Oct. 29, 1958, p. 10.

of their political decisions on science, scientists had an entirely different image of decisionmakers. Decisionmakers were also given very low marks by all scientists on their ability to predict the changing social pattern flowing from political decisions or scientific innovation. Decisionmakers (along with atomic scientists) also perceived scientists' political acumen less positively than did the scientists themselves, but agreed that scientists have a better than average ability to predict the social consequences of scientific developments. Both groups agreed that decisionmakers generally shared a much greater similarity of views on atomic energy policy than did scientists. Given these perceptual differences there would appear to be considerable barriers to developing more broadly based scientific input into the decisionmaking process. As Calder has remarked, to be effective scientists must present "a coherent program . . . that can be sold as a package to the politicians."[1] Because of the contentious nature of the scientific community in Japan, and the evident strains between scientists and decisionmakers, coherent programs dealing with the broad aspects of a science policy and social change would seem to be particularly difficult to put together.

A very similar pattern of perceptual dissonance appears in the area of advisory relationships (nos. 11, 12, 13, 14, 15, 16). The dissonance comes out most strongly between social scientists and decisionmakers, and between physical scientists and decisionmakers. The least dissonance appears between the views of the atomic scientists on the one hand and physical scientists and decisionmakers on the other. About the only point of general agreement is the fact that decisionmakers have by far the greatest influence in policy determinations. Scientists overall felt much more strongly than

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[1]Calder, Technopolis, op. cit., p. 293.

decisionmakers that the opinion of the scientific community should weigh heavily in the selection of advisors, and that political opinions of scientists should not be a criterion for selection. Decisionmakers also overwhelmingly felt that when faced with conflicting scientific advice, a decisionmaker should make up his own mind based on his original policy objectives. While about half of the scientists would agree (atomic scientists much more readily than the others), they also suggested that advisory opinions or decisionmaker action be deferred until agreement among advisors can be reached, or even in some cases that the decisionmaker act on the advice of the scientific majority. The tradition of executive dominance is clearly confirmed in this pattern of responses, although there is evidence of a considerable degree of perceptual dissonance between what _is_ and what _ought to be_. This is especially true for social scientists.

One reason for the great success that the atomic energy development program has met in Japan is undoubtedly the fact that there is widespread agreement that a source of cheap electrical power should be the primary goal of the program. Even social scientists and decisionmakers agreed on this point. Atomic scientists as a group were more divided on the relative priority of cheap electric power over an independent research and development capability, but even they agreed by a solid majority that an economical energy supply was the chief objective. All groups were generally consistent in their ratings of the relative influence that major bureaucratic actors have on the policymaking process, and distinguished between the formal distribution of influence and actual working relationships. Thus, they recognized MITI as having a generally high degree of influence although it has only a peripheral connection to the atomic energy development program in a formal sense, and accorded the JSC a very minor role in spite of its supposed major advisory role.

The least amount of perceptual dissonance appeared on those issues relating to the defense aspects of atomic energy (nos. 17-27, 33). The greatest differences here occured between decisionmakers and scientists in all groups. On the question of a Japanese nuclear weapons force this perceptual difference was more one of degree than of opposition of views. All groups rejected the idea that Japan would ever need nuclear weapons, but the scientists did so more strongly. Decisionmakers (and physical scientists to a greater extent than other scientists) felt that Japan might have need of them in the event there was widespread proliferation. Atomic scientists were the most optimistic in their views that Japan would never, in fact, acquire nuclear weapons. Social scientists appeared the least optimistic, for while nearly all could see no possibility that Japan would ever have need of nuclear weapons, only a little over half felt Japan would never acquire a nuclear force. While decisionmakers were less likely to suggest that Japan would never need such weapons, they were much more ready than any of the scientists' groups to say that nuclear weapons are destabilizing for the international political system. The pattern of perceptions that occurs on this question (no. 17) may not reflect scientists' views entirely accurately, since there were a large number of "Other" responses. The great majority of these said there should be no more nuclear weapons, Japan should never have nuclear weapons, or the like. While the question was designed to elicit cognitive attitudes on the actual political effect of nuclear weapon proliferation, many of these respondents expressed their affective attitudes in the open answer space.

All groups felt that atomic energy could be regulated best on an international level, and strongly supported IAEA inspections of atomic energy programs. Scientists also supported the idea of legal and personal responsibilities for citizens to report suspected violations of safeguard regulations. The decisionmaker group was more evenly divided in its attitude toward such responsibilities. Decisionmakers were much stronger in their support for the NPT, however, than were any groups of scientists. The idea of a Northeast Asian nuclear-free zone was received enthusiastically by scientists (especially atomic scientists), but got only moderate support from decisionmakers. Opinions varied widely between scientists and decisionmakers on whether Japan should or should not, at some future date, make use of atomic explosions for peaceful purposes. A third of all scientists rejected such uses, but practically no decisionmakers did so. Of those in each group who supported such programs, opinions were split on whether there should be international control of such devices or whether Japan should develop her own capability. Finally, the nuclear defense arrangement between Japan and the United States appears to be of questionable credibility to all groups. While there was a great variation in responses and many inserted comments, the consensus seems to be that the United States is unlikely to use its nuclear weapons to defend Japan and, in any event, would do so only if such an action was determined to be in American interests at the moment. Overall, both scientists and decisionmakers are highly internationally oriented in their approaches to the defense-related questions. However, decisionmakers as a group seem to be more conservative in taking steps which would close the door to future policy options or which might increase the influence of extra-societal actors in the internal Japanese policymaking process.

<u>Impact of scientists on the Japanese political system</u> There is little evidence to suggest that

Japanese scientists have had any sustained or substantial impact on the decisionmaking process in Japan or that they can be expected to have any in the future. The role of the Japanese scientific advisor in atomic energy policymaking appears to be a rather limited one, closely limited to the scientist's field of expertise. While the scientific community is represented in most technology assessment groups, the membership of such bodies tends to be weighted heavily in favor of government and business interests.

The Japanese view of the science advisor might be said to have been aptly summarized by Sir Solly Zuckerman, a former British defense advisor. Zuckerman has said that "(s)ince the scientist is in the public arena only as the expert worker and advisor, it is his employer . . . which commands his service and which has the responsibility for action. The decision whether to accept or reject his advice is theirs (the employers') and theirs only."[1] Science and technology have had a considerable impact, directly and indirectly, in both the input and output aspects of political decisionmaking. However, scientists have had little effect in shaping or channeling these impacts in Japan. To the extent that Japanese scientists seek active political roles in shaping societal goals, setting societal priorities or allocating societal resources, they will very probably be frustrated in most instances. The scientist appears destined to be generally either a technician, coopted by the political establishment in a limited advisory role, or a cassandra, articulating what he feels to be the general will, only to be faced with an unresponsive political system and an indifferent public.

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[1]Calder, Technopolis, op. cit., pp. 155-56.

CHAPTER VIII

INTERNATIONAL LINKAGES: THE NUCLEAR NONPROLIFERATION TREATY

Political decisionmaking has been discussed in this study as the process whereby societal goals are formulated, societal priorities established, and societal resources allocated. Chapters II through VII have analyzed this process primarily as an interplay of factors within the national political unit. National policymaking processes are not immune to influences from the larger international environment, however, This is the case especially in policy areas involving complex technological systems like atomic energy. Chapters IV and V, dealing with the nuclear fuel cycle and international technology exchanges, described the way in which the atomic energy development program in Japan is linked in its many and varied facets to the global atomic energy community.

Chapters VIII and IX analyze these global linkages from the standpoint of national security and the nonproliferation question. Chapter VIII deals with the Japanese debate and eventual signing of the Nuclear Nonproliferation Treaty. What the NPT would entail, should Japan ratify it, would be the direct penetration of non-Japanese political actors into Japanese domestic political processes through limitations on the policy options open to Japanese decisionmakers and restrictions on resources that could be allocated within Japan. Most Japanese did not regard this as entirely legitimate, but on practical grounds it was difficult to reject the NPT completely. The agonizing search for consensus on the NPT and Japan's continued reservations on the Treaty will be detailed here.

Chapter IX treats the international security aspects of the nonproliferation issue and Japan's role as an international actor. The rationale behind the arguments being made for Japanese nuclear forces will be examined, and an analysis will be made of the strategic context within which a Japanese nuclear force must operate. It is suggested that the decision on a nuclear defense force for Japan will rest as much, if not more, on factors external to the Japanese scene as on deliberate policy designs in Tokyo.

The Nonproliferation Treaty: Debate and Signing

The Nonproliferation Treaty went into effect on March 5, 1970, culminating a ten-year effort. The movement to frame a legal instrument which would halt the spread of nuclear weapons began officially on December 4, 1961 with the introduction of the "Irish Resolution" into the Sixteenth Session of the United Nations General Assembly. Approximately two weeks later the Eighteen Nation Disarmament Committee (ENDC) was formed to provide a forum for the exchange of opinions among the NATO bloc, Warsaw Pact, and non-aligned states.[1]

In August, 1965 an American draft resolution was presented to the ENDC at Geneva. The following month a Soviet draft was announced at the U.N. General Assembly. By August, 1967 both countries had reached general agreement on a single draft, with the principal exception of the article

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[1]The ENDC included the United States, Great Britain, France, Italy, and Canada from NATO; the Soviet Union, Poland, Czechoslovakia, Rumania, and Bulgaria from the Warsaw Pact; with Brazil, Mexico, Ethiopia, Nigeria, Egypt, India, Burma, and Sweden representing the non-aligned states. The United States and the Soviet Union served as co-chairmen. France soon dropped out of the committee but the name was retained.

relating to safeguards. In March, 1968 a draft treaty was presented jointly to the General Assembly. The final text was agreed upon after debate, and on June 12 the proposed treaty was commended to the world community in a formal resolution. On July 1, 1968 the NPT was signed by sixty-one nations, and under the ratification requirements set out in Article IX, became effective on March 5, 1970.[1]

The overall goals set out in the NPT received wide support in Japan. There was a general desire to end the nuclear arms race between the superpowers. Therefore, to control the dissemination of atomic technology among the numerous lesser world powers, and to have Japan serve as a prestigious member of the civilian atomic energy world community, the government pledged Japan's broadest participation. However, specific provisions in the proposed treaty itself were subjected to considerable debate within the government, between the Liberal-Democratic and opposition parties, and among the population in general. In the first place, the Japanese always considered the NPT to be essentially an unequal treaty. The NPT, in Japanese eyes, was made in Moscow and Washington with the interests of smaller powers receiving only tangential consideration. In short, it was felt that the proposed Nonproliferation Treaty would freeze Japan and other non-nuclear-weapon states into a permanent military inferiority of the most concrete dimensions, tempered only by generalized assurances of equality in the peaceful uses of atomic energy.

In the second place, while the nuclear powers viewed the proposed treaty essentially as a mechanism for avoiding a global nuclear conflict,

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[1]For a more detailed account of the chronology of the NPT see Mason Willrich, Non-Proliferation Treaty: Framework for Nuclear Arms Control (Charlottesville, Virginia: The Michie Co., 1969), pp. 53-54; and "The Non-Proliferation Treaty and the IAEA," International Atomic Energy Agency Bulletin, X (1968), 3-7.

the Japanese perceived in it a greater, long range objective: nuclear disarmament. These differences in viewpoint, on the equality of treaty members and the ultimate objective of the treaty, caused Japan to hesitate in signing the agreement. They also account for the fact that Japan has still not ratified the NPT. Japan has certain expectations of the treaty which, if unfulfilled, could jeopardize the very concept embodied therein.

The debate over the Nonproliferation Treaty in Japan revolved around five major issues: (1) nuclear disarmament, (2) security of the non-nuclear-weapon states, (3) equality in the peaceful uses of atomic energy, (4) the time frame of the treaty, and (5) inspection of atomic energy facilities.[1] The discussion of these points proceeds in four parts. First, the general normative expectations of the Japanese public and leading political actors in the period prior to the release of the first Soviet-American draft are examined. These expectations are compared, on each of the five issues noted above, with the actual provisions appearing in the final treaty in July, 1968. Second, the debate on these same points are examined from the perspectives of the opposition parties, the LDP, and the government. Third, the evolution of the positions of the major political actors are analyzed during the period between the introduction of the first Soviet-American draft in August, 1967 and the formal signing of the document by the three sponsoring states in July, 1968. The factors which finally brought Japan around to signing the treaty are examined along with reactions to this move

[1]These issues, which were to cause such lengthy debate in Japan, were anticipated in UNGA Resolution No. 2028, passed in November, 1965 shortly after the first American and Soviet drafts were presented. The resolution called for an agreement which would close all proliferation loopholes, reach an equitable balance on the respective responsibilities and obligations of both the nuclear-weapon and non-nuclear-weapon states, and serve as as a step toward nuclear disarmament. See Lawrence Scheinman's account in "Nuclear Safeguards, the Peaceful Atom and the IAEA," International Conciliation, No. 572 (March, 1969), 9.

within Japan. Finally, the questions of Japanese ratification of the NPT and of Japan's reservations on the inspection and disarmament and security provisions contained in the treaty are analyzed.

General Policy Implications of the NPT

The issues

Nuclear disarmament.--When the United Nations began discussing the American and Soviet draft treaties on nonproliferation in the autumn of 1965, Japanese U.N. Ambassador Matsui and Foreign Minister Shiina outlined Japan's position of disarmament and the NPT. First, the proposed treaty should be considered as one part of an overall nuclear disarmament program. Second, the treaty should include a prohibition on all nuclear testing. Evidence of Tokyo's concern over disarmament was the announcement in April, 1966 by the Foreign Ministry that it intended to set up a special Disarmament Office.[1] Vice Foreign Minister Shimoda Takezo even stated at one point that Japan could not become a signatory to the pact without a reduction of the nuclear weapon arsenals maintained by the superpowers or, at least, a sincere declaration on their part to do so.[2]

It is doubtful that the Japanese ever really expected the nuclear-weapon powers to make substantial reductions in their nuclear weapon holdings during the course of the NPT discussions. It was recognized that while such a *quid pro quo* was just, it would not be an "absolute condition" for signing.[3] The most the government really expected, probably, was a statement by the Soviet Union and the United States expressing their

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[1] Tokyo Shimbun, Feb. 14, 1966 in DSJP, Feb. 14, 1966, p. 8.

[2] Sankei Shimbun, Feb. 19, 1966 in DSJP, Feb. 19, 1966, p. 4.

[3] Nihon Keizai, Apr. 23, 1966 in DSJP, Apr. 26, 1966, p. 3.

intention to reduce nuclear arms. The Japanese wanted this pledge to appear within the body of the treaty rather than simply in the preamble as the superpowers had suggested.[1] Japan was to be disappointed on the disarmament issue just as she was to be on the desire for a ban on underground testing, even though the neutral members of the ENDC gave their support on this latter question.[2]

There is no question but that the Nonproliferation Treaty failed to incorporate the Japanese view that the primary goal of the agreement was to serve as a first step to worldwide nuclear disarmament. The main purpose of the NPT, as stated in the preamble, is to "avert the danger of (a nuclear) war . . . ." It is true that the signatories, once again in the preamble, pledged to "seek to achieve the discontinuance of all test explosions," and declared "their intention to achieve at the earliest possible date cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament." There is nothing binding about these declarations, however, nor any deadlines to encourage speedy realization of them. The farthest the nuclear-weapon states would go was to agree to "pursue negotiations in good faith" on bringing about an end to the arms race and achieving nuclear disarmament (Article VI).

Clearly, the latter is not going to happen any time soon. The NPT might even possibly make nuclear disarmament less likely. By institutionalizing the preponderant American-Soviet voice in the nuclear weaponry consortium, the NPT should reduce the uncertainty which led the two powers to the conference table in the first place. The adherence of France and China to the treaty, while it would lend more stability to relationships

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[1]Nihon Keizai, Feb. 22, 1967 in DSJP, Feb. 22/23, 1967, p. 6.

[2]Mainichi Shimbun, Feb. 20, 1967 in DSJP, Feb. 22, 1967, pp. 36-38.

among the great powers and close the proliferation circle, would be welcome but would not necessarily increase the possibility of nuclear disarmament. Evidently, the present nuclear-weapon states have confidence in their ability to control the use of their own bombs. None of them, including France and China, seem inclined to proliferate nuclear weapons to non-nuclear-weapon states regardless of what military or ideological alliances may exist between them. But neither do they appear to predicate the success of nonproliferation on the speedy denuclearization of their own weapon arsenals.

Some movement has been observed recently in the area of strategic arms limitations, but SALT owes little to the NPT. Limiting strategic armaments in order to reduce military budgets or to stabilize weapon systems planning is a desirable payoff in and of itself. It requires a qualitative jump to bridge the strategic gap, however, between limiting armaments and eliminating them altogether.

Thus, it appears that Japanese demands for concrete nuclear disarmament within the context of the NPT are bound to be frustrated. Such arms reductions as do occur will be limited in nature and will come about as a result of understandings between the nuclear-weapon states with little, if any, causal connection with nonproliferation schemes. On the other hand, provided the nuclear-weapon states truly have the will to limit or reduce nuclear arms, a universally observed understanding on nonproliferation would likely help to prepare the way.

<u>Security of non-nuclear-weapon states</u>.--One immediate concern of the non-nuclear-weapon states, which were being asked to deny themselves access to nuclear defenses, was security. Japanese defense policy was founded on three

assumptions. First, Japan did not intend to rely on nuclear weapons for defense. Second, Japan expected a general arms reduction to accompany a nonproliferation agreement. Third, the basis of Japanese security would continue to be the U.S.-Japan Security Treaty.[1] As one conservative newspaper observed, "nonproliferation" did not preclude consultation between nuclear-weapon and non-nuclear-weapon states with mutual security treaties on such matters as nuclear planning, target selection or the use of nuclear devices.[2]

The Security Treaty between the United States and Japan was a volatile domestic political issue at this time. Debate over the defense relationship between the two countries was carried out not only in terms of the NPT, but also in the context of the American "nuclear umbrella" and the upcoming Okinawan reversion. Even among those who favored Japanese-American ties many hoped for renegotiation of the treaty. When the Soviet Union proposed that the nonproliferation draft include a clause prohibiting nuclear attacks on non-nuclear powers, the question of the American "umbrella" was drawn clearly.

In the eyes of the socialists, Japan could not qualify for exemption from nuclear attack while under the U.S.-Japan Security Treaty because there was no guarantee against the introduction of nuclear weapons into Japan. The Liberal-Democratic Party took the stand that, since the Security Treaty was wholly defensive in intent, there was no conflict in retaining it while accepting a Soviet guarantee as well. The Foreign Ministry indicated that the Soviet proposal was more intended to weaken the Security Treaty than

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[1]Tokyo Shimbun, Feb. 14, 1966 in DSJP, Feb. 16, 1966, p. 8; and Feb. 21, 1966 in DSJP, Feb. 21, 1966, p. 2.

[2]Nihon Keizai, Apr. 23, 1966 in DSJP, Apr. 26, 1966, p. 3.

anything else, and at any rate, the pledge would be meaningless in practice without real efforts at disarmament.[1] Foreign Minister Shiina clouded the issue by explaining that the "nuclear umbrella" was a matter of interpretation. If considered in the general sense that the United States' nuclear arsenal was a deterrent to global nuclear war, then Japan was indeed under the umbrella. If, however, one implied an umbrella consisting of an Asian multilateral nuclear force on the order of NATO, then Japan could not be considered to be under the American nuclear umbrella.[2]

The problem of China was also a major security question. Many Japanese were concerned that the cause of nonproliferation would be hopeless should China not be included in the proposed treaty. Since there was little likelihood that China would agree to sign, what then should be the Japanese attitude?[3] Professing to speak for the Foreign Ministry, one editor suggested that, without China, Japan would have to "reserve its attitude."[4]

The Chinese bomb was not viewed as having an entirely negative effect on nonproliferation, however. Whatever the feelings on the need for Japan to sign the NPT, it was agreed generally that the treaty was an unequal one. Some people concluded, therefore, that the Chinese nuclear force might encourage the nuclear-weapon states to be more accommodating to the smaller, non-nuclear states to forestall their following the Chinese. As the Mainichi Shimbun editorialized, Chinese nuclear weapons should be seen "not as a

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[1] Mainichi Shimbun, Feb. 17, 1966 in DSJP, Feb. 17, 1966, p. 18; Asahi Shimbun, Feb. 19, 1966 in DSJP, Feb. 22, 1966, p. 30.

[2] Tokyo Shimbun, Feb. 19, 1966 in DSJP, Feb. 19, 1966, p. 34.

[3] See, for instance, the discussion by Wakaizumi Kei in the Mainichi Shimbun, Nov. 19, 1966 in DSJP, Dec. 3, 1966, pp. 26-31; Yomiuri Shimbun, Feb. 21, 1966 in DSJP, Feb. 19, 1966, p. 6.

[4] Nihon Keizai, Apr. 23, 1966 in DSJP, Apr. 26, 1966, p. 3.

threat on the nuclear-holding nations, but rather as a stimulant to have non-nuclear-holding nations raise demands for acquiring nuclear weapons, and also as a showing that even less-developed nations can develop nuclear weapons in a comparatively short period of time."[1]

The Nonproliferation Treaty gave Japan little in the way of added security except in the general sense that the world is presumed to be a safer place now that the treaty has gone into effect. Article VII does tacitly encourage regional treaties to ban nuclear weapons by expressly stating that the treaty does not prohibit them. In an effort to assuage some of the anxiety expressed by the non-nuclear-weapon states over their security (or lack of it), the United States, the Soviet Union, and Great Britain all supported United Nations Security Council Resolution No. 255 in June, 1968. Under this resolution, Security Council members are required to take "immediate action" should an act of aggression or threat of aggression with nuclear weapons take place against a non-nuclear-weapon state. The resolution further specifies the right of individual or collective self-defense for any such victim until the Security Council can act.[2]

From the Japanese standpoint, the "guarantee" so expressed is less than iron clad. The form a Security Council action would take, in the event Japan were attacked or threatened with nuclear weapons, is unclear. There is no definition of what a "threat" consists of, nor is it at all certain that the Security Council could agree that a threat had been made, much less on how to deal with it. It is not surprising that Japanese question the

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[1]Mainichi Shimbun, Feb. 23, 1967 in DSJP, Feb. 23, 1967, p. 3.

[2]William C. Foster, "United States, United Kingdom, and Soviet Union Propose Security Assurances Resolution," Department of State Bulletin, LVIII (March 25, 1968), 401-03.

reliability of such security guarantees. Unless they are absolute, such pledges are considered essentially worthless. But if they are absolute, how credible are they? The difficulty with any such credible guarantee to the non-nuclear-weapon states is that they are, in David Vital's words, "locked into the super powers' own strategic deadlock."[1]

Moreover, since the NPT was signed by Japan in 1970, the government of the People's Republic has taken over China's seat in the United Nations, including the Security Council. The only conceivable instance in which the Security Council guarantee could have any practical application for Japan would have been in the event of a nuclear attack by the Chinese. Whatever comfort Tokyo may have found in the tripartite guarantee must have largely evaporated with the seating of Peking in the United Nations. Before Japan can place any real confidence in the guarantees of her security under the NPT, China will have to be included in its framework.

While the nuclear-weapon signatories see increased national security stemming from the NPT, other states, Japan among them, do not find such a direct correlation. The nonproliferation of nuclear weapons will be successful only so long as the potential-nuclear-weapon states feel secure, and/or are convinced that the acquisition of nuclear weapons would not afford them a measure of protection great enough to overcome the decrease in security that such a step would, ipso facto, entail. The treaty does not, in itself, provide this security. One Japanese observer recently noted that because of the status quo nature of the NPT it really makes little difference for the security of a country without nuclear forces whether it becomes a

[1] David Vital, "The Problems of Guarantees," in Preventing the Spread of Nuclear Weapons, ed. by Charles F. Barnaby (London: Souvenir Press, 1969).

party to the treaty or not.[1] It was exactly this point that helped to make possible Japan's signing. The NPT presented the best hope of putting some order into the rapid dissemination of atomic energy technology throughout the world. Meanwhile, for Japan, the Security Treaty with the United States remained intact.

Peaceful uses of atomic energy.--On the issue of peaceful uses of atomic energy, there was a desire generally among Japanese for an NPT guarantee of full technological equality between the nuclear-weapon and non-nuclear-weapon states. The editor of the Tokyo Shimbun stated the Japanese case most succinctly.

> In every respect we must say that this is a one-sided treaty which is favorable only for the nuclear holding nations . . . . At least the right of peaceful nuclear development should be naturally recognized for all nations under reliable international inspection.[2]

The only real disagreement was over the use of nuclear explosions for peaceful purposes. A rather forceful pronouncement with a semi-official character was made on this point by Shimoda Takezo, the Administrative Vice-Minister of Foreign Affairs. In February, 1967 Shimoda stated publicly that the right to use atomic energy for peaceful purposes must be assured in the NPT. Furthermore, he claimed that nuclear testing for peaceful uses should be within Japan's rights under the treaty. Without this provision, Shimoda suggested, Japan would have to give "grave consideration" to the proposed treaty.[3]

The socialists objected to any use of nuclear explosions for any

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[1] Ryukichi Imai, "The Non-Proliferation Treaty and Japan," Bulletin of the Atomic Scientists, XXV (May, 1969), 4.

[2] Tokyo Shimbun, Feb. 19, 1967 in DSJP, Feb. 21, 1967, pp. 1-2.

[3] Sankei Shimbun, Feb. 10, 1967 in DSJP, Feb. 10, 1967, p. 13.

purpose, peaceful or otherwise. The press, in general, took the attitude that since the technological possibilities of such nuclear devices were still unknown, it would be best to retain options for future use should they prove feasible. The Latin American Non-Nuclear Armament Treaty, signed that same month, contained an article dealing with the right to use peaceful nuclear explosions in the future, and this encouraged the Japanese to demand that the NPT also include such a guarantee.[1] The Shimoda statement itself was applauded by the press for underscoring the "egoism" of the major powers.[2] Such forceful language was seen as serving two ends. Since Japan was not privy to the Soviet-American draft discussions, and since it did not have a seat on the ENDC, Vice Minister Shimoda's stand would state Japan's case vigorously in these councils. Also, the Shimoda statement was welcomed as a realistic assessment which would encourage public debate on the vital issue in Japan.[3]

While Prime Minister Sato reportedly stressed that Shimoda's views were strictly personal, the government nevertheless demanded Japan's right of full access to atomic technology in the future. Foreign Minister Miki stated the issue succinctly in March, 1967 at an ENDC meeting. Although not an official policy statement, Miki probably capsulized the thinking of many Japanese both in and out of public life. During a discussion of peaceful explosions, he said:

> I would like to state that the Government has no intention at this time to develop nuclear explosives. What I wish to say here is that our future generations should not be deprived of the opportunity to take

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[1] Yomiuri Shimbun, Feb. 21, 1967 in DSJP, Feb. 22/23, 1967, p. 45; Mainichi Shimbun, Feb. 23, 1967 in DSJP, Feb. 22/23, 1967, pp. 3-5.

[2] Sankei Shimbun, Feb. 12, 1967 in DSJP, Feb. 11/13, 1967, p. 3.

[3] Asahi Shimbun, Feb. 11, 1967 in DSJP, Feb. 14, 1967, p. 28.

part in the progress of atomic science towards the utilization of its fruits for peaceful purposes.[1]

However, to have pressed the issue of peaceful explosions too forcefully would only have stimulated criticism at home and might have delayed Japan's signing, while needlessly irritating the United States, which had already come out against the use of such explosives by non-nuclear-weapon states until such time as peaceful devices could be distinguished technologically from nuclear weapons. Science and Technology Agency Director Nikaido acknowledged that while peaceful explosions did not violate the letter of the Atomic Energy Basic Law, they would perhaps be interpreted as violating its spirit because of the military implications any such move would have.[2] The Foreign Ministry explained that "although it (the government) will call for recognition of nuclear explosives for peaceful purposes as a right, it does not mean it intends to conduct nuclear explosions immediately by this."[3] Foreign Minister Miki assured the country that Japan could forego its option at this time without compromising its future equality in the peaceful development of atomic energy.[4]

On the issue of equality in the uses of peaceful atomic technology, the Nonproliferation Treaty would appear to offset most of Japan's immediate fears that in accepting restrictions on the military development of nuclear energy it would be hobbling its civilian atomic energy program as well. The preamble affirms that the benefits of peaceful applications, "including any technological by-products which may be derived . . . from the development of

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[1] Barnaby, Preventing the Spread of Nuclear Weapons, op. cit., p. 58.

[2] Sankei Shimbun, Mar. 10, 1967 in DSJP, Mar. 11, 1967, p. 24.

[3] Mainichi Shimbun, Feb. 23, 1967 in DSJP, Feb. 23, 1967, p. 40.

[4] Nihon Keizai, Mar. 9, 1967 in DSJP, Mar. 9, 1967, p. 7; Asahi Shimbun, Mar. 3, 1967 in DSJP, Mar. 4, 1967, p. 17.

nuclear explosive devices . . .," will be available to all parties to the treaty. It also provides for the "fullest possible exchange of scientific information." Again, in Article V, the nuclear-weapon states support the right of non-nuclear-weapon states to share in the benefits of peaceful nuclear explosions. Actual explosions are to be supervised by a nuclear-weapon state, and the service is to be provided at a price "as low as possible." It was further stated that when calculating the cost of nuclear explosions the nuclear-weapon states will not include the cost of previous research and development. While it is assumed that no non-nuclear-weapon states will conduct their own explosions, they are guaranteed the "right to participate in the fullest possible exchange of equipment, materials and scientific and technological information . . ." (Article IV).

While such assurances would seem to satisfy the fears of the non-nuclear-weapon states for the time being, there are generalities which could lead to differing interpretations in the future. Mason Willrich has pointed out, for instance, that the prohibition on the "manufacture" of nuclear weapons is really quite vague, since there is nothing to explain how it is possible to separate the civilian and military aspects of the manufacturing process. All of the stages of civilian atomic power production can have military significance, since it is not until the latter steps of the fuel cycle that civilian and military applications can be differentiated.[1] The problem of the centrifugal separation technique has already been discussed. The question of nuclear explosions for peaceful purposes is another issue that could cause disagreement in the future. Should the non-nuclear-weapon states feel that they were not sharing fully in the "by-products" of such explosions at some future point, those with the potential to do so might

[1]Willrich, Non-Proliferation Treaty, op. cit., pp. 91-93.

decide to manufacture their own "devices."

Term of the treaty.--Another objection raised in Japan on the draft nonproliferation treaty was over the length of time it was to run. Since it was considered unequal, many people feared that Japan would suffer if committed for too long a period. Moreover, since a pledge by the super-powers to reduce nuclear armaments was to be a condition for Japan's signing, it was felt that the movement on disarmament should be reviewed periodically. Should the potential nuclear powers be safely tucked away under the limitations of the NPT for twenty-five years, the Soviet Union and the United States might not assign nuclear disarmament as high a priority as they would if it were made a condition for continuing a nonproliferation agreement.

There was widespread support for a five year limit on the treaty. This, it was felt, would encourage flexibility on other questions like disarmament, security, and peaceful uses. At the same time, it would encourage the widest possible international participation in the treaty and give it the best chance of success.[1] The government came out in favor of a longer period of validity but with the opportunity for "restudy" every five years or so.[2]

The Japanese were generally pleased with the time frame provisions of the NPT and with the opportunities provided for renegotiation. Article VIII provides for a review conference in Geneva five years after the treaty takes effect; viz., 1975. In twenty-five years (1995) a conference is to meet to decide by majority vote whether or not the treaty should continue in force

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[1]Nihon Keizai, Apr. 23, 1966 in DSJP, Apr. 26, 1966, p. 3.

[2]Nihon Keizai, Mar. 9, 1967 in DSJP, Mar. 9, 1967, p. 7.

(Article X). Between those two dates, the parties are given the opportunity to call for a review of the treaty once every five years if a majority of them so desire. Article X also includes a three-month withdrawal clause to be used in the event a country feels its "supreme interests" are "jeopardized" by continued adherence to the agreement.

The Nonproliferation Treaty may be amended if at least one-third of the parties request the depositary governments (United States, Soviet Union, and Great Britain) to call a conference. Amendments become effective when approved by majority vote, including the nuclear-weapon states and the members of the IAEA Board of Governors (Article VIII), of which Japan is a member. Amendments are binding only on those governments that deposit ratification of the amendment.

Inspection.--International inspection of civilian atomic energy facilities was one of the most intractable problems of all in the search for a workable nonproliferation agreement. In the first place, the inspection proposals put forth by the nuclear-weapon states were the most blatant confirmation of the national inequality to be written into the NPT. It was the non-nuclear-weapon states that would have to submit to foreign inspection of their peaceful atomic energy operations. The Nonproliferation Treaty would not require the nuclear-weapon states to submit to inspection of their civilian facilities, and certainly would not infringe upon the secrecy of privileged military information. The fact that the United States and Great Britain voluntarily accepted inspection of their civilian programs still did not erase the second class status that the treaty would impose on the non-nuclear powers in their own eyes. Even before the final draft was agreed considered inspection a major irritant. As Foreign Minister Miki frankly stated, "Japan makes it a principle that all countries should undergo inspection by the International Atomic Energy Agency."[1]

Article III of the Nonproliferation Treaty requires all non-nuclear-weapon states to accept IAEA safeguards on all source and special fissionable material, whether inside or outside a nuclear facility, that is being "produced, processed or used." The pledge in the preamble "to cooperate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities" is underwritten by the promise "to avoid hampering the economic or technological development of the Parties" (Article III), and by recognition of the principle that inspection shall be performed "by use of instruments and other techniques at certain strategic points . . ." (preamble). These three points--unfettered economic development, maximum use of mechanical inspection devices, and concentration of inspections at critical stages in the fuel cycle--were insisted upon by the non-nuclear-weapon states. They constitute, most probably, the absolute minimum conditions under which international inspection can proceed in these countries.

Government and Party Views

Opposition parties Of the four opposition parties in Japan, two (the communists and the Komeito) opposed the proposed treaty from the start, and two (the socialists) gave qualified support to certain parts of the treaty during this period. All came out in opposition to Japan's signing in March, 1970, however.

The communists.--Of the four parties, the policy stand of the Japan Communist Party was the most unequivocal. The communists opposed the NPT

[1]Nihon Keizai, May 12, 1967 in DSJP, May 13, 1967, p. 29.

outright as long as Japan retained its Security Treaty with the United States. Rather than moving toward world peace, the NPT, in the view of the JCP, was simply placing Japan more securely under the American nuclear umbrella and making its destruction all the more certain in the event of a nuclear war.[1]

Komeito.--Komeito, likewise, was opposed to the NPT from the start. First, the party called for total nuclear disarmament and insisted that this objective be outlined in specific terms in the treaty. A simple pledge by the superpowers to work toward a mutual reduction of arms was deemed insufficient. Second, the NPT was not considered to furnish adequate security to the non-nuclear-weapon states. It did not include China or France, nor was there any prohibition of underground nuclear tests. Moreover, Komeito insisted on a clear prohibition on introducing nuclear weapons, without which the party would "oppose any self-justified treaty, like the U.S. draft, which is designed to perpetuate nuclearized countries' nuclear monopoly and bring in nuclear weapons to non-nuclearized countries."[2]

Komeito also objected to the inspection system which it felt threatened the peaceful atomic energy development program. Finally, Komeito advocated more explicit guarantees that Japan would not be shortchanged on peaceful atomic energy technology, including the use of nuclear explosive devices. The latter should be used only after nuclear disarmament was completed,

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[1] Yomiuri Shimbun, Mar. 9, 1967 in DSJP, Mar. 9, 1967, p. 34; Sankei Shimbun, Apr. 14, 1967 in DSJP, Apr. 14, 1967, p. 2.

[2] Komei Shimbun, May 16, 1967 in DSJP, May 19, 1967, p. 37.

however.[1]

The socialists.--The Japan Socialist Party (JSP) and the Democratic Socialist Party (DSP), unlike the JCP and Komeito, at first gave qualified support to the NPT. However, like the former, they too, held considerable reservations on the substance of the treaty. Both the JSP and the DSP viewed the Nonproliferation Treaty as a step toward the ultimate goal of disarmament. The JSP Central Executive Committee lent its conditional support in March, 1967 to the "conclusion of an agreement concerning nuclear non-proliferation as the first step to a total ban on nuclear weapons and then total abrogation."[2] Both parties also agreed that the non-nuclear-weapon states must be guaranteed full equality in the peaceful uses of atomic energy, but unlike Komeito, neither the JSP nor the DSP supported the use by Japan of nuclear explosions for peaceful purposes.[3]

On the question of national security, the JSP urged that Japan issue a unilateral declaration renouncing the use of nuclear weapons while, at the same time, banning all nuclear submarines and aircraft carriers from the waters around the home islands and Okinawa.[4] The DSP, on the other hand, looked upon Japan's potential for manufacturing nuclear weapons as a bargaining tool that should be exploited in order to enhance the security of

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[1]Komei Shimbun, Mar. 2, 1967 in DSJP, Mar. 3, 1967, pp. 1-2; and May 16, 1967 in DSJP, May 19, 1967, pp. 36-38; Tokyo Shimbun, Mar. 31, 1967 in DSJP, Apr. 6, 1967, p. 13; Mainichi Shimbun, Apr. 12, 1967 in DSJP, Apr. 12, 1967, p. 36.

[2]Yomiuri Shimbun, Mar. 9, 1967 in DSJP, Mar. 9, 1967, p. 34; see also Tokyo Shimbun, Jan. 20, 1967 in DSJP, Jan. 21, 1967, p. 19; Mainichi Shimbun, Mar. 31, 1967 in DSJP, Apr. 6, 1967, p. 13.

[3]Sankei Shimbun, Feb. 21, 1967 in DSJP, Feb. 21, 1967, p. 37; Tokyo Shimbun, Mar. 31, 1967 in DSJP, Apr. 6, 1967, p. 13; Yomiuri Shimbun, Mar. 9, 1967 in DSJP, Mar 9, 1967, p. 34.

[4]Tokyo Shimbun, Jan. 20, 1967 in DSJP, Jan. 21, 1967, p. 19.

the state in the international sphere. While the JSP would have Japan announce a unilateral non-nuclear declaration, the DSP looked instead to a joint declaration by the nuclear-weapon powers to guarantee the security of the non-nuclear-weapon states.[1]

The Democratic Socialists also pushed the idea of a "non-nuclear club," composed of potential-nuclear-weapon countries, which would put pressure on the United States and the Soviet Union to come to terms with states like Japan that had indicated their willingness to forego a nuclear defense program in return for nuclear disarmament, increased national security guarantees, and equality in the development of the peaceful uses of atomic energy. In essence, the "non-nuclear club" would serve as a coordinated front to impress upon the superpowers the nuclear weaponry potential of countries like Japan, West Germany, and India.

Interest was expressed in various quarters on the possibility of joint foreign policy action, especially between Japan and West Germany. Prime Minister Sato addressed the concept in general terms, but deliberately played it low key. No government move was ever made openly to effect such a policy alliance. However, in April, 1967 two representatives were dispatched abroad to convey Japan's reservations on the NPT. While former Vice Foreign Minister Ohno Katsumi traveled to the United States, JAEC Commissioner Nishimura Kumao exchanged views with leaders in Sweden, West Germany, Italy, Switzerland, and India. All of the latter were, of course, prominent potential-nuclear-weapon states.[2] The DSP continued to search out the possibilities of cooperation by the nuclear weapon "potentials" on discrete

[1] Tokyo Shimbun, Mar. 31, 1967 in DSJP, Apr. 6, 1967, p. 13; Yomiuri Shimbun, Mar. 9, 1967 in DSJP, Mar. 9, 1967, p. 34; Asahi Shimbun, Apr. 21, 1967 in DSJP, Apr. 27, 1967, pp. 14-16.

[2] Yomiuri Shimbun, Apr. 12, 1967 in DSJP, Apr. 12, 1967, pp. 31-32.

policy questions.[1]

Both the DSP and the JSP felt that the non-participation of France and China, especially the latter, was a major weakness of the proposed NPT. The JSP proposal was first, to bring China into full membership in the United Nations, and then include her in an international disarmament conference. Only then, it was argued, could China be expected to adhere to the objectives of the treaty. The DSP, more chary of Chinese objectives, looked upon Peking's foreign and military policy more as the product of China's status as a nuclear-weapon state than as a function of its highly advertised championship of the "have not" countries. The DSP preferred a United Nations declaration guaranteeing all non-nuclear-weapon states against the nuclear-weapon powers, including China and France. These latter two, as well as the United States, the Soviet Union and Great Britain, the DSP felt, would be susceptible to pressure from a united coalition of potential nuclear powers.[2]

The government and the LDP Within the LDP there were differences of opinion on the proposed nonproliferation agreement, but party leaders refrained from seeking a formal policy declaration until after the government made its stand clear. The government itself was by no means satisfied with the draft presented by the United States and the Soviet Union, and launched the Diet debate in the spring of 1967 with mixed feelings. While supporting nonproliferation generally and desiring the widest possible international participation, the government held the treaty to be inherently unequal and

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[1] Mainichi Shimbun, Sep. 7, 1967 in DSJP, Sep. 8, 1967, p. 7; and Nov. 19, 1966 in DSJP, Dec. 3, 1966, pp. 26-31; Sankei Shimbun, Mar. 18, 1967 in DSJP, Mar. 21, 1967, p. 1.

[2] Asahi Shimbun, Apr. 21, 1967 in DSJP, Apr. 27, 1967, pp. 14-16; Mainichi Shimbun, Apr. 12, 1967 in DSJP, Apr. 12, 1967, p. 35.

needing considerable negotiation.[1]

On disarmament, the government professed to see movement, and indicated it would accept Soviet and American assurances at face value for the time being. The NPT would be regarded as a step toward "general and complete disarmament" in Japan, it was explained, while both nuclear-weapon and non-nuclear-weapon states were urged to "share their duties and obligations" and "respect each others' opinions." As evidence of the superpowers' goodwill, Japan would insist that a pledge to continue efforts on nuclear disarmament be included in the body of the treaty, and not just in the preamble as had been previously suggested.

As to Japanese security, the cabinet placed its reliance, for the time being, on the U.S.-Japan Security Treaty. However, the government acknowledged that the defense relationship would have to be changed in the future.[2] Spokesmen expressed hope that the whole international security

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[1]For the government's position on the NPT see Japan Report, XIII (June 15, 1967), 5-6; Mainichi Shimbun, Apr. 16, 1967 in DSJP, Apr. 16, 1967, p. 36; Nihon Keizai, Mar. 14, 1967 in DSJP, Mar. 14, 1967, p. 25; Sankei Shimbun, Mar. 20, 1967 in DSJP, Mar. 20, 1967, p. 17; Tokyo Shimbun, Mar. 14, 1967 in DSJP, Mar. 14, 1967, p. 33; Yomiuri Shimbun, Mar. 14, 1967 in DSJP, Mar. 14, 1967, p. 21; and Apr. 12, 1967 in DSJP, Apr. 12, 1967, pp. 31-32.

[2]The government's attitude on the Security Treaty was supported by a considerable body of public opinion. The results of a few public opinion surveys taken in Japan in recent years clearly indicate that the treaty, in its 1952 and 1960 versions, was not acceptable as a permanent defense arrangement. In 1957, for instance, one poll revealed that 35 per cent of the respondents preferred neutrality and 24 per cent reliance on the United Nations as the chief focus of defense policy. In 1966 a similar poll showed 25 per cent in favor of neutrality and 26 per cent preferring the U.N. as Japan's chief security guarantor. In the earlier sample, 14 per cent chose to rely on the United States; by 1966 those favoring this approach had declined to 7 per cent. Another 1966 poll showed that less than 10 per cent of those sampled favored the Security Treaty in its current form. Both 1966 polls showed considerable support (20 and 22.5 per cent) for strengthening autonomous Japanese self-defense forces.

An Asahi poll taken in late 1968 revealed that 29 per cent of those sampled believed that the Security Treaty had not been helpful to Japan. Although a full third of the public said the treaty had been helpful, 31 question could be handled through the United Nations. Naturally, the success of any international security scheme was predicated on the achievement of a workable Soviet-American nuclear disarmament agreement. Up to 1967, nearly all Japanese had been generally dissatisfied with the proposals dealing with the security of the non-nuclear-weapon states.

Nuclear disarmament and international security, while issues of high political import, could be influenced only peripherally by Japan. Aside from expressing confidence in the future success of the Soviet-American dialogue, there was little the Japanese government could do directly to achieve the paramount goals except to cajole the superpowers and continue to call attention to their common interests in reducing international tension. On the three other issues about which debate on the NPT was centered (peaceful uses of atomic energy, term of the treaty, and inspection) Japanese influence could be more direct. It was on these points, and especially the latter, that the government intended to demand the most specific guarantees.

On the question of the peaceful uses of atomic energy, the government was inclined to accept American promises to continue the broad technological exchange program that had grown up between the two countries, along with assurances that Japan would benefit from the technological spin-off of the vast American military research and development program. When peaceful

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per cent had no answer. Only 4 per cent wanted the Security Treaty extended in its current form for ten years, while 42 per cent favored moving toward termination "at a proper opportunity." Another 28 per cent expressed the desire for a more flexible defense partnership under a revised arrangement with the United States. Finally, another poll taken at the same time found that over half of those interviewed hoped for a U.N. guarantee or some form of unarmed neutrality. Less than 17 per cent favored continuing the U.S.-Japan Security Treaty. These opinion surveys are described in more detail in Kim, Major Issues in Japan's Security Policy Debate, op. cit., pp. 47-49; Asahi Shimbun, Jan. 5, 1969 in DSJP, Jan 7, 1969, pp. 22-23; and Tokyo Shimbun, Jan. 1, 1969 in DSJP, Jan. 11/13, 1969, pp. 29-31.

atomic explosions became technically feasible they were to be made available to Japan under the supervision of a "proper international organ."

There was probably broader agreement by all parties in Japan on the government's demand for a restudy "at fixed internals" of the NPT than on any other point. This solidarity was indicative of the mistrust the Japanese felt generally toward the unequal treaty. The non-nuclear-weapon states reasoned that they were being asked to forego some very important military options and to submit to intrusions into their industrial operations which could prove commercially harmful. In return, they would receive from the major powers impressive sounding but purposely vague and unenforceable pledges on disarmament and security. The opportunity to reconsider this exchange of vows was absolutely essential if Japan was to accede to the Nonproliferation Treaty. The government also suggested that any amendments to the treaty be made only by unanimous vote. This opportunity for periodic reappraisal of the agreement and assurance that the non-nuclear-weapon states would not suffer discrimination in the peaceful applications of atomic energy were the most critical issues in determining Japanese support for the NPT.

The inspection issue has already been discussed. Of all the provisions of the draft treaty, this was the most openly discriminatory. The Japanese objected to the Soviet-American approach to inspection on three grounds. First, of the parties to the agreement, only the non-nuclear-weapon states would be bound by its restrictions on the use of fissionable material. Second, of the various civilian and military atomic energy programs, only the former would be limited by the proposed treaty. Third, the inspection procedures outlined in the draft did not appear to contain adequate protection against industrial espionage or disruption of power plant operations.[1] Japan, in particular, further balked at the disparity between Euratom inspection procedures and those of the IAEA. The latter, which would apply in Japan, were considered more stringent.

The Japanese were well aware that the nuclear-weapon states would never consent to opening their military programs to inspection, and the Soviet Union objected to foreign inspectors on its soil for whatever purpose. It was necessary, however, to put the government on record as opposing this unequal state of affairs. Therefore, Tokyo took a pro forma position in April, 1967 that inspection should apply in principle to all countries, and that this should be so stipulated in the Nonproliferation Treaty.

Debate on the American-Soviet Drafts and Signing of the NPT

The first Soviet-American draft Agreement on the first Soviet-American draft treaty was reached in August, 1967. Initial government reaction to the draft was reserved. Foreign Minister Miki indicated support, but made clear that Japan would strive to make certain alterations in the final document. Accordingly, he ordered the various ministries affected by the terms of the agreement to "conduct studies to the full extent as to what problems will arise."[2]

Miki welcomed the "hope" for disarmament contained in the joint draft, but felt that the treaty should be more specific on the subject of dismantling nuclear weapon arsenals. Chief Cabinet Secretary Kimura, in a press conference at the Prime Minister's residence, underscored the need for

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[1] Arnold Kramish, "The Watched and the Unwatched: Inspection in the Non-Proliferation Treaty," Adelphi Papers, No. 36 (June, 1967), pp. 1-7; and Willrich, Non-Proliferation Treaty, op. cit., pp. 99-100.

[2] Tokyo Shimbun, Aug. 29, 1967 in DSJP, Aug. 30, 1967, p. 22; Asahi Shimbun, Aug. 25, 1967 in DSJP, Aug. 25, 1967, pp. 11-12.

some firm obligation on disarmament, if not in the NPT, then in a United Nations resolution. He also emphasized the necessity for periodic rediscussion to be provided for in the treaty.[1] On the matter of security for the non-nuclear-weapon states, the Foreign Minister expressed hope that a practical formula could be reached in place of the vague guarantees contained in the draft document.

As to assurances that the non-nuclear-weapon states would receive equal treatment in the peaceful development of atomic energy, the Foreign Minister pronounced himself satisfied. The LDP[2] on August 29 confirmed Miki's stand but with a slightly enhanced word of caution that Japan's rights should not be endangered by the NPT.[3] Miki was also pleased with the five year redeliberation clause in the Soviet-American draft, but he sought, in addition, periodic rediscussions which would be well planned in advance to ensure that such talks would have real significance. The provision that any amendments to the treaty would require the affirmative vote of all members of the IAEA Board of Directors (of which Japan was a member) was welcomed, since it gave Japan a veto over any changes in the form of the agreement.[4]

Chief Cabinet Secretary Kimura announced that Japan would make no commitment on signing the NPT at the present time, but would decide on the basis of what form the final treaty would take and what public reaction

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[1] Yomiuri Shimbun, Aug. 31, 1967 in DSJP, Aug. 31, 1967, p. 23.

[2] Approval was given in a statement issued under the signatures of Foreign Minister Miki, Executive Board Chairman Shiina, and Foreign Affairs Research Council President Kawashima.

[3] Tokyo Shimbun, Aug. 29, 1967 in DSJP, Aug. 30, 1967, p. 22.

[4] Asahi Shimbun, Aug. 25, 1967 in DSJP, Aug. 25, 1967, pp. 11-12; Tokyo Shimbun, Aug. 25, 1967 in DSJP, Aug. 25, 1967, pp. 17-18.

might be to it.[1] In the meantime, Ambassador Tanaka Hiroto, in charge of disarmament affairs, returned to Geneva in the middle of September with instructions to press the ENDC to include Japanese views on inspection, periodic restudy, and disarmament in the new draft revision.[2]

The joint draft was dramatically silent on one important question, i. e., international inspection. Foreign Minister Miki reiterated his government's earlier call for equal inspection of all parties to the treaty. Fears that inspection would expose commercial secrets had been circulating for some time within atomic industry circles. The fact that the Russians and Americans could not agree on an inspection formula between themselves did nothing to alleviate these misgivings. The JAEC's comment on the draft stressed the need to keep inspections at a minimum and to confine inspections of private industry to a simple "follow-up" of spent fuel, rather than actual inspection of reactor operations. Besides being apprehensive over the loss of production secrets, the atomic power industry was distressed over the great expense involved in shutting down reactors for the inspectors to do their work.[3]

The signing of a Japanese-British-IAEA agreement in September made the inspection issue of immediate practical interest. Under the terms of this treaty, the commercial power reactor at Tokai-mura was being placed under IAEA inspectors for the first time. Although the IAEA, at its General Meeting in Tokyo in 1965, had declared that during inspections reactor "operation shall not be suspended," it was questionable whether the rule would stand in this case. The new IAEA inspectors were not as familiar with

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[1] Yomiuri Shimbun, Aug. 31, 1967 in DSJP, Aug. 31, 1967, p. 23.

[2] Mainichi Shimbun, Sep. 12, 1967 in DSJP, Sep. 12, 1967, p. 21.

[3] Tokyo Shimbun, Aug. 29, 1967 in DSJP, Aug. 30, 1967, pp. 18-19.

the operating characteristics of the British-made Tokai reactor as the British inspectors had been. It was anticipated that the inspections would be both a nuisance and expensive.[1]

The JAIF, speaking for the atomic industry as a whole, made several suggestions for improved inspection procedures. First, the industry preferred that inspections concentrate on the entire fuel cycle, not just reactor operations. It was argued that because of frequent reactor design changes it was impractical for the IAEA inspectors to be completely familiar with all construction alterations. Various checks could be carried out throughout the fuel cycle with little or no effect on electric power production, and inspectors could cross-check financial and power consumption records for added verification. Second, the JAIF called for a guarantee of compensation in the event of damage caused by production disruptions, and also for legal sanctions for divulging commercial secrets. Third, Japanese industry spokesmen supported equal inspection of all countries.[2] In summary, it was suggested that "a safeguards system as a whole will be applied successfully only as its requirements are found compatible with commercial requirements."[3]

These and other issues were discussed with American representatives at a conference in Tokyo in November.[4] Japan pressed its demand for impartial inspection of all nuclear nations, and sought to clarify that the technology exchanges provided for in the NPT would cover concrete techniques and not

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[1]Nihon Keizai, Nov. 8, 1967 in DSJP, Nov. 16, 1967, p. 19.

[2]Atoms in Japan, VII (September, 1967), 1-5; and Tokyo Shimbun, Oct. 23, 1967 in DSJP, Oct. 23, 1967, p. 43.

[3]Atoms in Japan, VII (September, 1967), 3.

[4]The delegations were headed by Murata Hiroshi, Atomic Energy Bureau Director, and Herbert Scoville, Jr., Director of the Bureau of Science and Technology in the Arms Control and Disarmament Agency.

simply information.[1] Japan's fears that the centrifuge uranium enrichment process might be banned under the NPT were laid to rest.[2] Article III of the American-Soviet draft on inspection, still to be filled in, was discussed at some length. The United States rejected the Japanese view that IAEA inspectors should refrain from inspecting reactors.[3] Evidently both sides anticipated further trouble over the inspection issue for, in a closing statement to the press, they agreed to "work on the IAEA to stipulate clearly regulations for inspections and improving the quality of inspections, in order to wipe out doubts concerning the contents of IAEA inspection . . . ."[4]

In an effort to spur the non-nuclear-weapon parties to early acceptance of the NPT draft, President Johnson, in December, 1967, offered to allow the IAEA to inspect peaceful atomic energy facilities in the United States under the same procedures as would be applied to the non-nuclear-weapon states under the treaty. JAIF members were invited to view an inspection in process at the Yankee Atomic Power Station in Rowe, Massachusetts, and reportedly commented on the "non-intrusive" nature of the inspection.[5] Great Britain followed the American lead in opening its peaceful facilities to the IAEA. The Soviet Union continued to oppose any international inspection of any Soviet atomic energy facility.

The second Soviet-American draft A second draft, including an inspection

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[1] Mainichi Shimbun, Nov. 1, 1967 in DSJP, Nov. 2, 1967, p. 5.

[2] Mainichi Shimbun, May 2, 1967 in DSJP, May 3, 1967, pp. 11-12; and Asahi Shimbun, Nov. 3, 1967 in DSJP, Nov. 3, 1967, p. 19.

[3] Asahi Shimbun, Nov. 2, 1967 in DSJP, Nov. 2, 1967, p. 41.

[4] Mainichi Shimbun, Nov. 3, 1967 in DSJP, Nov. 3, 1967, p. 15.

[5] Lawrence Scheinman, "Security and a Transnational System: The Case of Nuclear Energy," International Organization, XXV (Summer, 1971), p. 645.

article, was presented to the ENDC in January, 1968. The Japanese still held reservations, and the Asahi Shimbun correspondent in Geneva wrote that the new draft still did not come up to the non-nuclear-weapon states' "minimum line."[1] In particular, the provisions on disarmament, security of non-nuclear-weapon states, and inspection were still less than Japan had hoped for. While continuing to push revisions on these points, the government decided to focus its efforts on inclusion of a provision for periodic review every five years. This, it was felt, was desired generally by the non-nuclear-weapon states, would not meet much opposition from the drafting parties, and would allow for more flexibility on those points on which no final agreement was likely to be reached.[2] Japanese concern over the security question was somewhat allayed when a proposal was made by the United States, the Soviet Union, and Great Britain for a tri-partite guarantee through the U.N. Security Council on the non-use of nuclear weapons against non-nuclear-weapon states.

Despite misgivings, the Japanese government announced that this latest draft was a step forward and offered security even to nations like India which feared China but objected to the NPT. Among the opposition parties, the DSP responded favorably while the JSP unofficially gave lukewarm support. The pro-China wing of the JSP denounced the tri-partite guarantee as directed at China and argued that the nuclear umbrella so proposed could only harden Chinese resistence to the NPT. Moreover, opponents of the measure called attention to the likelihood of a "veto" should the three protectors disagree over a future case which would come within the purview of the present

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[1] Asahi Shimbun, Jan. 23, 1968 in DSJP, Jan. 26, 1968, pp. 28-30.

[2] Mainichi Shimbun, Feb. 11, 1968 in DSJP, Feb. 11, 1968, pp. 26-27; and Tokyo Shimbun, Feb. 26, 1968 in DSJP, Feb. 24/26, 1968, p. 26.

understanding. Komeito, still against the treaty overall, welcomed the guarantee, but preferred that it be made a part of the treaty, *per se*, rather than just a U.N. resolution. The communists dismissed the plan as a "ruse" designed to distract public attention from American imperialism.[1]

Meanwhile, on March 15, the LDP issued a basic policy statement entitled "On Nuclear Policy," which reaffirmed the party's support of the three non-nuclear principles within the context of the U.S.-Japan Security Treaty, and pledged to continue efforts for nuclear disarmament and for the peaceful uses of atomic energy.[2] By doing so the party leaders hoped to undercut growing opposition to the NPT, and thereby reduce the possibility of having Diet resolutions passed which might both embarass the government and disrupt plans for signing the document.[3]

Within the industrial community there were still misgivings on the proposed treaty, too. Protection of Japan's residual right to conduct peaceful explosions with nuclear devices was one concern expressed by the JAIF. Also, more firm disarmament provisions and reduction of the term of the treaty from twenty-five to ten years were called for. The greatest doubt was over inspection, and this was not diminished by the second Soviet-American draft presented in January.[4] Industrialists were disturbed by the special burden placed on Japan by the inspection procedures. The United

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[1] *Mainichi Shimbun*, Mar. 9, 1968 in *DSJP*, Mar. 9, 1968, pp. 21-23.

[2] The policy paper was released jointly by the Diplomatic Affairs Research Council, the Security Affairs Research Council, and the Okinawa Problem Special Committee.

[3] *Asahi Shimbun*, Mar. 6, 1968 in *DSJP*, Mar. 8, 1968, pp. 45-46; and *Yomiuri Shimbun*, Mar. 16, 1968 in *DSJP*, Mar. 16, 1968, pp. 27-28.

[4] *Atoms in Japan*, XII (February, 1968), 3-5; *Atoms in Japan*, XII (July, 1968), 3-5; *Mainichi Shimbun*, Feb. 23, 1968 in *DSJP*, Feb. 23, 1968, p. 16; and *Nihon Keizai*, Mar. 12, 1968 in *DSJP*, Mar. 12, 1968, p. 28.

States, Great Britain, and the Soviet Union did not come under the obligatory inspection clause, while Japan's other chief atomic competitors escaped with what the Japanese considered less stringent "self-inspection" within Euratom.

Fears that the NPT would perpetuate the junior partner status in atomic energy which Japanese leaders had been trying to overcome for a decade were lent credence by the IAEA inspections which had been taking place. Nihon Keizai, for instance, complained about the onerous inspections being conducted by the IAEA which in the last nine months of 1969 had consumed fifty-eight working days and disrupted reactor operations repeatedly.[1] Shortly before the NPT was due to go into effect, the Japan Atomic Energy Industrial Council[2] urged the government to exercise "caution" in signing since the effects that the treaty would have in scientific and technical fields would take some time to determine. The Council's prediction was for stiff competition in the future between three atomic energy centers--Japan, the United States, and Western Europe.[3] But whatever objections they might have had on specific provisions in the NPT, businessmen and industrialists in general concluded that to risk "isolation" would be a far greater danger. Most probably agreed with the editor of the Nihon Keizai who warned that failure to endorse the NPT would force Japan out of the mainstream of international atomic energy developments and cast a "shadow" over Japan's entire atomic energy program.[4]

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[1]Nihon Keizai, Feb. 2, 1970 in DSJP, Feb. 11, 1970, p. 22.

[2]The Japan Atomic Energy Industrial Council is a committee of businessmen involved in various aspects of industrial applications of atomic energy in Japan. The Committee at this time was headed by Kiyonari Hajime, Deputy Director of the PNC.

[3]Nihon Keizai, Feb. 2, 1970 in DSJP, Feb. 11, 1970, pp. 19-20.

[4]Nihon Keizai, Apr. 23, 1969 in DSJP, Apr. 24, 1969, pp. 1-3.

Japan signs the NPT The Nonproliferation Treaty was signed by the United States, the Soviet Union, Great Britain, and fifty-eight non-nuclear-weapon states on July 1, 1968. Spokesmen for the LDP and the Foreign Ministry confirmed that the government was intending to sign the agreement soon, probably in the autumn after the conclusion of the House of Councillors elections in July and the Conference of Non-Nuclear Weapon States in September.[1]

Two developments delayed Japan's intended signing. First, the Soviet invasion of Czechoslovakia in August, and a simultaneous announcement of new Poseidon and Minuteman missile tests by the United States cast doubt on the seriousness of the superpowers' intentions to curb their military power and work for disarmament. On August 25 France exploded its first hydrogen bomb, and this act gave further cause to doubt the wisdom and the effectiveness of the NPT.[2] Noting that West Germany, Italy, India, and Brazil--all potential-nuclear-weapon states--had not signed, sentiment in Japan against the treaty quickly jelled.

A second development encouraged the government to postpone signing the treaty. There was hope that the non-nuclear-weapon states would work together to prevent the kind of "arbitrary action" by the nuclear-weapon states that the world had just witnessed.[3] This was not borne out, however, during the month of discussions held in Geneva by ninety-two non-nuclear-weapon countries. On certain issues, like calling for an end to the nuclear

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[1] Sankei Shimbun, June 12, 1968 in DSJP, June 13, 1968, p. 14; Mainichi Shimbun, Oct. 22, 1968 in DSJP, Oct. 22, 1968, p. 10; Tokyo Shimbun, July 24, 1968 in DSJP, July 25, 1968, p. 6.

[2] Yomiuri Shimbun, Aug. 21, 1968 in DSJP, Aug. 27, 1968, pp. 1-2; and Aug. 26, 1968 in DSJP, Aug. 27, 1968, p. 9.

[3] Sankei Shimbun, Sep. 9, 1968 in DSJP, Sep. 13, 1968, pp. 1-3.

arms race, nuclear disarmament, and dissemination of peaceful atomic energy technology--matters over which the delegate countries exercised little responsibility--there was general agreement. When it came to voting for machinery for financing and administering technical development programs and on a test ban, there was strong support but also a considerable number of abstentions. On substantive issues like the non-use of force between states, the IAEA safeguard system, IAEA inspections, and actual exchanges of atomic energy information and material, the number of states abstaining on and opposing conference resolutions were so great as to make the resolutions meaningless.[1]

The Japanese were most disappointed in the results of the conference. The impracticality of treating all non-nuclear-weapon states as a bloc had been made undeniably clear. Questions like the security of non-nuclear-weapon states, non-nuclear zones, and cooperation in the peaceful uses of atomic energy, which had generated so much concern in Japan over the past months, had not moved off dead center as a result of the conclave. Evidence of great power meddling behind the scenes deepened convictions that the smaller states were often not their own masters.[2] This was especially the case in the defeat of a Latin American proposal for a multilateral security conference to define the security guarantees given by the United States, the Soviet Union, and Great Britain in the United Nations.[3] One post-mortem called for "shelving" the NPT temporarily.

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[1]Hearings before the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons, 90th Cong., 2nd Sess., pt. 1 at 342-44 (1968).

[2]Tokyo Shimbun, Oct. 1, 1968 in DSJP, Oct. 2, 1968, pp. 2-3; and Nihon Keizai, Oct. 1, 1968 in DSJP, Oct. 2, 1968, pp. 4-6.

[3]Scheinman, "Nuclear Safeguards, the Peaceful Atom and the IAEA," op. cit., p. 13.

> What was revealed through the latest conference was the split attracted by the interests of various small nations which do not yet have the latent ability of nuclear development, as well as the ever-continuing egoism of the super big powers which manipulate those small nations from behind the scenes.[1]

In view of these events, the Japanese government determined to put off signing the treaty. The decision was applauded by opposition parties as well as by the LDP, although not necessarily for the same reasons. The communists smugly proclaimed that the "contradictions" in the treaty were already apparent, but they took little solace in the fact that under current international conditions, the security ties binding Japan to the United States were being strengthened. Komeito, likewise, welcomed the delay, but accused the LDP of seeking nuclear arms. The JSP was relieved that there would be time for more debate; the DSP, least adamant of the opposition forces, continued to give qualified support, but felt that more consideration of the overall Japanese-American relationship was called for since Japan was "too much the model student in its relations with the U.S."[2]

Over the next sixteen months the debate over signing continued. In large part it became a question of timing. The Japanese government was hesitant to commit the country before the major NPT sponsors had agreed to their own handiwork. Soviet and American ratifications were being delayed because the Soviet Union was concerned, above all, with the West German position. Without Bonn's acquiescence, it was doubtful the Soviet government would agree to the treaty.

There was considerable speculation that the Sato government was attempting to make use of this bottleneck in central Europe to its own advantage. Since the United States had placed the highest priority on

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[1] Mainichi Shimbun, Oct. 1, 1968 in DSJP, Oct. 2, 1968, pp. 1-2.

[2] Mainichi Shimbun, Sep. 19, 1968 in DSJP, Sep. 19, 1968, pp. 23-25.

Russian participation, and since a Russian decision was predicated on prior West German action, it was suggested that Japan's bargaining position vis a vis the United States on Okinawa would be considerably strengthened by a Tokyo-Bonn understanding on the NPT. There was ample coincidence of interests already. Germany had all along led the non-nuclear-weapon states in demanding strict security guarantees from the superpowers,[1] and it had pushed hard to have the "strategic points" inspection concept included in the treaty.[2]

When questioned on this possibility by Representative Sone (DSP) at a Foreign Affairs Committee meeting in May, 1969, Foreign Minister Aichi observed that the NPT was "influential material" for bringing about the "nuclear-free" reversion of Okinawa.[3] However, on the following day, when the same point was raised by Representative Mori (JSP), the Foreign Minister stated he had "no intention to use Japan's participation in the said Treaty as a tool for bargaining in the negotiation on reversion of Okinawa and other matters."[4] The contradiction did not pass unnoticed, and the arrival of West German Chancellor Kiesinger in Tokyo on May 19 added fuel to speculations that a joint strategy had been reached on the Nonproliferation Treaty.[5]

Japan was also hoping to be admitted to the ENDC prior to signing the NPT since membership on that body would provide it an official forum from which to pressure the major powers on nuclear disarmament. Japanese

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[1]Scheinman, "Nuclear Safeguards, the Peaceful Atom and the IAEA," op. cit., p. 11.

[2]Ibid., p. 40.

[3]Mainichi Shimbun, May 15, 1969 in DSJP, May 15, 1969, p. 17.

[4]Mainichi Shimbun, May 15, 1969 in DSJP, May 16, 1969, p. 12.

[5]Nihon Keizai, May 21, 1969 in DSJP, May 22, 1969, p. 40.

representation on this body was approved in May, 1969.[1]

By the end of June most of the foreign policy obstacles to Japan's signing had been resolved. The United States and the Soviet Union were expected to ratify the NPT soon, barring another Czechoslovak-type incident. West Germany had announced its intention to sign after elections were held in the autumn. Foreign Minister Aichi's visit to Washington earlier in the month brought encouraging news on Okinawan reversion. With its seat on the ENDC Japan was assured that its voice would continue to be heard on disarmament, a major weakness of the treaty in the Japanese view. There remained only to reach a "national consensus" within Japan.

As soon as it had been realized in September, 1968 that all bets were temporarily off on the NPT, a major restudy of the treaty and its ramifications for Japan's foreign and defense policies had been undertaken. At that time, Foreign Minister Miki met with Chairman Funada of the LDP Security Affairs Research Council and Chairman Kawashima of the party's Foreign Affairs Research Council. The three agreed to set up a subcommittee composed of members of both party councils to seek out views within the government and throughout industry. The STA was expected to explore the implications of the treaty for nuclear energy development as a whole.[2]

By the following summer the LDP leadership had determined the time was ripe to formulate a final party position on the NPT. The Foreign Affairs Research Council met on July 4. Council Chairman Kawashima announced that the most immediate goal would be to reach some general agreement by the time Foreign Minister Aichi went to Washington in September to confer with

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[1] Yomiuri Shimbun, May 24, 1969 in DSJP, May 24, 1969, p. 17.

[2] Mainichi Shimbun, Sep. 20, 1968 in DSJP, Sep. 20, 1968, p. 20.

Secretary of State Rogers on the reversion of Okinawa.[1]

The Foreign Ministry appeared to be most anxious to bring about agreement on signing. However, many party leaders, including Vice President Kawashima, were more cautious, and some were quite outspoken in their opposition. In an effort to win over these conservatives, a compromise plan was agreed to by the Foreign Ministry. In return for an early signing, ratification would be delayed so the attitudes of other states to the treaty could be observed.[2] The Foreign Ministry was most anxious to have the treaty signed in the autumn around the time Prime Minister Sato was scheduled to visit President Nixon in Washington to conclude a time schedule for the return of Okinawa. At the end of August, the LDP Foreign Affairs and Security Research Councils met along with the Okinawa Problem Special Committee, but could agree only to continue "careful study" of the issue.[3]

Some of the most articulate and persistent opposition in the Liberal-Democratic Party to the NPT came from Nakasone Yasuhiro. Nakasone suggested that Japan could best use its nuclear potential as a "trump card," and he advocated that Japan should develop its peaceful atomic energy capabilities fully while retaining freedom of action on possible future military applications.[4] His concerns about the treaty's effect on Japan's peaceful atomic energy program were shared by many other responsible figures both in and out of government. At the time, the major fear was that, once the threat

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[1] Yomiuri Shimbun, July 5, 1969 in DSJP, July 8, 1969, pp. 12-13.

[2] Such a compromise plan had been suggested by the Foreign Ministry as early as January. See the account in the Tokyo Shimbun, Jan. 25, 1969 in DSJP, Jan. 25, 1969, p. 35.

[3] Mainichi Shimbun, Aug. 30, 1969 in DSJP, Aug. 30, 1969, p. 21.

[4] Mainichi Shimbun, Sep. 16, 1969 in DSJP, Oct. 8, 1969, p. 32; and Sankei Shimbun, Jan. 30, 1970 in DSJP, Jan. 30, 1970, p. 25.

of lateral proliferation of nuclear weapons was removed by the NPT, the United States and the Soviet Union would find less need to respond to the non-nuclear-weapon states' expectations on disarmament, security, and sharing of peaceful atomic technology. Moreover, Nakasone challenged the signing on the grounds that the LDP had reached no agreement on a grand nuclear strategy, and thus could not fit the Nonproliferation Treaty into the larger question of international security.[1] Nakasone argued, at a minimum, for the right to secede from the treaty if it became apparent that nuclear disarmament was not being pursued by the superpowers in a forthright manner.[2]

Opposition notwithstanding, the Foreign Affairs Research Council reported favorably on signing in October.[3] The United States was expected to question Prime Minister Sato on Japan's intentions when he visited President Nixon in November, and so the government sought to bring about a firm commitment from the LDP Executive Board prior to his departure. It was to be disappointed, however, for the Executive Board resolution called for the government _and the party_ to "produce a conclusion on the problem of taking part in the Nuclear Nonproliferation Treaty after careful studies . . . ." Not only did this position postpone still further a final decision, but it was interpreted to imply that the signing date would be subject to agreement by the party as well as the government. Prior resolutions by the various party organs involved in the treaty deliberations

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[1]_Mainichi Shimbun_, Sep. 16, 1969 in _DSJP_, Oct. 2, 1969, p. 10.

[2]_Mainichi Shimbun_, Aug. 30, 1969 in _DSJP_, Aug. 30, 1969, p. 22.

[3]_Asahi Shimbun_, Oct. 13, 1969 in _DSJP_, Oct. 13, 1969, p. 29.

had always left the actual timing to the government alone.[1]

Although the Japanese government failed to bring forth a party consensus prior to Sato's November visit to Washington, it was successful on its second try at the end of January. The Prime Minister had removed one barrier when he returned with a promise for the reversion of Okinawa in 1972. Moreover, the United States, the Soviet Union, and Great Britain had all ratified the NPT by the end of November. The requisite forty-three ratifications for bringing the treaty into effect were now expected earlier than had been anticipated. It was feared that should Japan not sign prior to effectuation of the treaty, it would be unable to participate in the preliminary talks on the IAEA inspection agreement which was to begin six months later.[2]

On January 26, a party consensus in favor of signing the NPT was announced at a joint meeting of the party's Foreign Affairs Research Council, Security Affairs Research Council, and Scientific and Technical Countermeasures Special Committee. The specific date of the signing was left up to the government. It was also noted, as much for foreign ears as for domestic consumption no doubt, that should Japan's reservations not be dealt with adequately, the government would be "cautious" in ratifying the treaty. The LDP Executive Board approved the resolution and the Cabinet announced its decision on February 3.[3]

The Question of Ratification

There was no rejoicing at the government "victory." The NPT was viewed

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[1]Tokyo Shimbun, Nov. 15, 1969 in DSJP, Nov. 17, 1969, p. 46.

[2]Tokyo Shimbun, Jan. 17, 1970 in DSJP, Jan. 21, 1970, p. 26.

[3]Tokyo Shimbun, Jan. 26, 1970 in DSJP, Jan. 27, 1970, p. 15.

as unsatisfactory by nearly everyone. Even Foreign Minister Aichi, who could be counted among its foremost proponents, stated on the occasion of the Cabinet's decision:

> We do not mean that it is quite desirable for Japan to sign this Treaty now. We think, however, that it is wiser for Japan to sign the Treaty than not to do so, when all things are taken into consideration.[1]

All four opposition parties opposed the signing. The JCP, predictably, was "strongly opposed." Komeito deemed the signing "mistaken" and "very regrettable."[2] A few months before, Komeito International Bureau Chief Kuroyanagi had compared the effect of the NPT to that of the 1922 Washington Naval Conference's 5:3:3 ratio for captial ships.[3] The JSP found the decision "regrettable," while the DSP described it as "problematical."[4]

Reaction in the press was less pessimistic. However, only the Tokyo Shimbun actually welcomed the signing. Its editorial also proposed prompt ratification.[5] Yomiuri and Asahi both labeled the signing "unavoidable," but perhaps the best way for Japan to realize some adjustment in the application of the NPT to peaceful use, disarmament, and security.[6] Mainichi editorials also characterized the Cabinet action as "unavoidable," but acknowledged "deep doubts and disappointment." The newspaper decried the signing as evidence that Japan still ranked as a defeated country, and castigated the government for assigning "precedence to diplomatic tactics

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[1] Nihon Keizai, Feb. 3, 1970 in DSJP, Feb. 5, 1970, p. 12.

[2] Asahi Shimbun, Jan. 27, 1970 in DSJP, Jan. 27, 1970, pp. 19-20.

[3] Mainichi Shimbun, Sep. 16, 1969 in DSJP, Oct. 2, 1969, p. 9.

[4] Asahi Shimbun, Jan. 27, 1970 in DSJP, Jan. 27, 1970, pp. 19-20.

[5] Tokyo Shimbun, Jan. 27, 1970 in DSJP, Jan. 28, 1970, pp. 1-2.

[6] Yomiuri Shimbun, Jan. 28, 1970 in DSJP, Jan. 29, 1970, p. 1; and Asahi Shimbun, Feb. 4, 1970 in DSJP, Feb. 4, 1970, pp. 3-4.

over the State's long-range policies."[1] Sankei Shimbun came out as "strictly opposed to the early signing of the NPT."[2]

The Cabinet's misgivings, even while agreeing to sign the treaty, were stated in a diplomatic "note verbale." The note first of all made clear that the Japanese government considered the NPT the "first step towards nuclear disarmament . . .," and expected the present inequality among parties to the treaty to decrease through the reduction of nuclear weapon arsenals. Additionally, the note warned that the "Treaty must in no way restrict non-nuclear-weapon states in their research, development, or implementation of the peaceful uses of nuclear energy, or in their international cooperation in these fields . . . ." A simplified inspection system was paramount in this regard.[3] Kosaka Zentaro, Chairman of the LDP Foreign Affairs Research Council, explained in general terms what the government had in mind. "We wish to keep inspection measures to the level of the IAEA (sic) underwriting Japan's own guarantee measures . . . ."[4]

The Nonproliferation Treaty went into effect on March 5, 1970. Japan, along with a number of other countries, has not yet ratified the document. Its signing indicated the government's intention to enter fully into the treaty, and bound it not to take any action that would directly contravene the treaty until such time as a formal decision on ratification is made in

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[1]Mainichi Shimbun, Jan. 30, 1970 in DSJP, Jan. 31, 1970, pp. 1-3.

[2]Sankei Shimbun, Jan. 27, 1970 in DSJP, Jan. 30, 1970, pp. 1-2.

[3]Asahi Shimbun, Feb. 3, 1970 in DSJP, Feb. 4, 1970, p. 30; Mainichi Shimbun, Feb. 4, 1970 in DSJP, Feb. 5, 1970, pp. 1-2; and Atoms in Japan, XIV (February, 1970), 21-23.

[4]Sankei Shimbun, Jan. 30, 1970 in DSJP, Jan. 30, 1970, p. 26.

the Diet.[1]

Reservations on international inspection Although the Japanese have expressed a number of objections to provisions in the NPT, the major reservation appears to be on the issue of inspection. On the occasion of U.S. AEC Chairman Glenn Seaborg's visit to Tokyo in March, 1970, approximately six weeks after Japan had signed the treaty, Foreign Minister Aichi was quoted as stating that "if the inspection agreement is simple and equal and is not an obstacle to Japan's utilization of atomic energy for peaceful purposes, Japan is ready to ratify the Treaty."[2]

However, to date, the Japanese have not been certain that inspections are necessarily simple or equal. The experience with IAEA inspections of the new Tsuruga commercial power reactor in Fukui Prefecture was especially upsetting. The IAEA inspectors insisted in this case on continuous daily inspections rather than the monthly checks conducted previously on the Tokai reactor.[3] Between October 4 and 23, fifty-four inspections took place.[4] The new procedures brought forth an immediate protest from the Japan Atomic Power Company and the Federation of Electric Enterprises to the Foreign Ministry, MITI and the STA.[5] A joint meeting of the LDP Foreign Affairs Research Council, Security Affairs Research Council, and Science and Technology Special Committee was held on November 13 and reconfirmed the

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[1]George Bunn, "Horizontal Problems of Nuclear Weapons," in Nuclear Proliferation: Prospects for Control, ed. by Bennett Boskey and Mason Willrich (New York: The Dunellen Co., 1970), p. 29.

[2]Sankei Shimbun, Mar. 25, 1970 in DSJP, Mar. 27, 1970, p. 21; see also Tokyo Shimbun, Mar. 25, 1970 in DSJP, Mar. 27, 1970, p. 8.

[3]Mainichi Shimbun, Nov. 1, 1970 in DSJP, Nov. 5, 1970, p. 39.

[4]Nihon Keizai, Nov. 15, 1970 in DSJP, Nov. 26, 1970, p. 21.

[5]Mainichi Shimbun, Nov. 1, 1970 in DSJP, Nov. 5, 1970, p. 39.

party's inspection policy of equality, simplicity, and preservation of commercial secrets.[1]

The IAEA moved to defuse the inspection issue shortly after the Tsuruga episode. A Safeguards Committee was set up in April, 1970 to continue the dialogue on this intractable question. The Committee met from June, 1970 to March, 1971 and produced a three-point system which went far toward incorporating the demands of the non-nuclear-weapon states.[2] First, national inspection systems would constitute the heart of the NPT inspection procedure. Second, national inspections would be verified by less frequent IAEA inspections. Third, inspection would concentrate on "strategic points" rather than seek comprehenviseness.[3]

Imai Ryukichi, the Japanese representative on the IAEA Safeguards Committee, has indicated that in his "un-official and semi-personal view," general agreement was reached on inspection principles and procedures during the course of these discussions. However, he added, "a great deal has been left to the level of subsidiary arrangements for further interpretation and implementation."[4]

Even if one assumes that agreement can be reached on an international

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[1]Mainichi Shimbun, Nov. 14, 1970 in DSJP, Nov. 14, 1970, p. 36.

[2]For one overview of Japanese thinking at this stage, see the summary of "An Approach to International Safeguards System," a paper presented in 1970 to the IAEA Panel on Safeguards Systems, in Atoms in Japan, XIII (September, 1969), 4-8.

[3]These "strategic points" were divided into three categories: (1) reactors and storage facilities; (2) other facilities handling plutonium or uranium enriched over 5 per cent such as reprocessing, conversion, and fabrication plants; and (3) other facilities handling uranium enriched less than 5 per cent. Inspection schedules varied from once a year to continuous, depending on the size of the facility and type of material being handled. See the discussion in Myron B. Kratzer, "Safeguards: Five Views," International Atomic Energy Agency Bulletin, XIII (1971), 12-13.

[4]Imai Ryukichi, "Safeguards: Five Views," op. cit., p. 7.

inspection system, there are still obstacles, and some feel they are formidable obstacles, to be overcome if inspections are to become institutionalized in international law. The most prominently mentioned problems are cost, clandestine diversion, and political acceptability.

The obstacle of cost.--During debate on the proposed Nonproliferation Treaty in the United States Congress, three estimates of the cost of international inspection under the NPT were introduced. One of these was prepared at the direction of Representative Craig Hosmer, an outspoken critic of the treaty. His estimates, based on what it would cost "to do the job the United States wants the IAEA to do," and including inspection of both nuclear-weapon and non-nuclear-weapon states, are shown below.

T. B. Taylor, who prepared Representative Hosmer's calculations, had earlier done a similar study for the International Research and Technology Corporation. It was based on the "minimum requirement" for inspection of non-nuclear-weapon states only, and the Taylor figures are considerably below those of the Hosmer study.

A third estimate was prepared by the Brookhaven National Laboratory for the U.S. AEC. The Brookhaven study is based on "present (1967) IAEA safeguard criteria,"[1] and poses three hypothetical cases based upon the number of parties, the type of activities, and the scope of activities to be inspected. The Brookhaven calculations of inspection costs under the NPT are considerably less than either of the previous two estimates. The results

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[1]IAEA inspection criteria in 1967 called for (1) inspection of "principal nuclear facilities" (separation and reprocessing plants, reactors, and other facilities designated by the IAEA); (2) one annual inspection per approximately every five kilograms in place or passing through a facility; and (3) continuous inspection by a resident inspector for facilities handling over sixty kilograms of fissionable material annually. See Kramish, "The Watched and the Unwatched," op. cit., p. 7.

TABLE 11

COST PROJECTIONS FOR IAEA INSPECTIONS: HOSMER ESTIMATES

Year	MW Electricity (World Total)	Number of Personnel	Cost
1971	57,000	514	$ 35,980,000
1975	180,000	1,295	90,650,000
1980	600,000	3,876	271,320,000
1985	1,500,000	9,382	656,740,000
1990	2,700,000	16,725	1,170,750,000

Source: Hearings before the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons, 90th Cong., 2nd Sess., Pt. 1 at 281 (1968).

COST PROJECTIONS FOR IAEA INSPECTIONS: TAYLOR ESTIMATES

Year	MW Electricity (World Total)	Number of Personnel	Cost
1971	57,000	380	$ 15,200,000
1975	180,000	993	39,700,000
1980	600,000	2,983	119,000,000
1985	1,500,000	7,254	290,000,000
1990	2,700,000	12,290	518,000,000

Source: Hearings before the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons, 90th Cong., 2nd Sess., Pt. 1 at 279 (1968).

TABLE 11--Continued

COST PROJECTIONS FOR IAEA INSPECTIONS: BROOKHAVEN ESTIMATES

Year	MW Electricity (World Total)	Number of Personnel Case A	Number of Personnel Case B	Number of Personnel Case C	Cost Case A	Cost Case B	Cost Case C
1971	n.a.*	775	476	394- 476	$ 29,800,000	$16,000,000	$13,000,000-16,000,000
1975	115,000	956	549	419- 549	40,100,000	20,400,000	15,400,000-20,400,000
1980	300,000	1,302	758	514- 758	60,600,000	34,100,000	23,100,000-34,100,000
1985	620,000	1,766	1,033	668-1,033	93,500,000	52,700,000	35,500,000-52,700,000
1990	1,050,000	2,374	1,387	829-1,387	143,300,000	69,500,000	40,300,000-69,500,000

Source: Hearings before the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons, 90th Cong., 2nd Sess., Pt. 1 at 285 (1968).

*Not available

BROOKHAVEN NATIONAL LABORATORY: HYPOTHETICAL INSPECTION CASES

Case	Parties Inspected[a] NWS	Parties Inspected[a] N-NWS	Type of Activities Civilian	Type of Activities Military	Scope of Activities Total	Scope of Activities Sample
A	X	X	X		X	
B		X	X		X	
	X[b]		X			X
C	X	X[c]	X			X

[a]NWS includes U.S., U.K., and U.S.S.R. only.

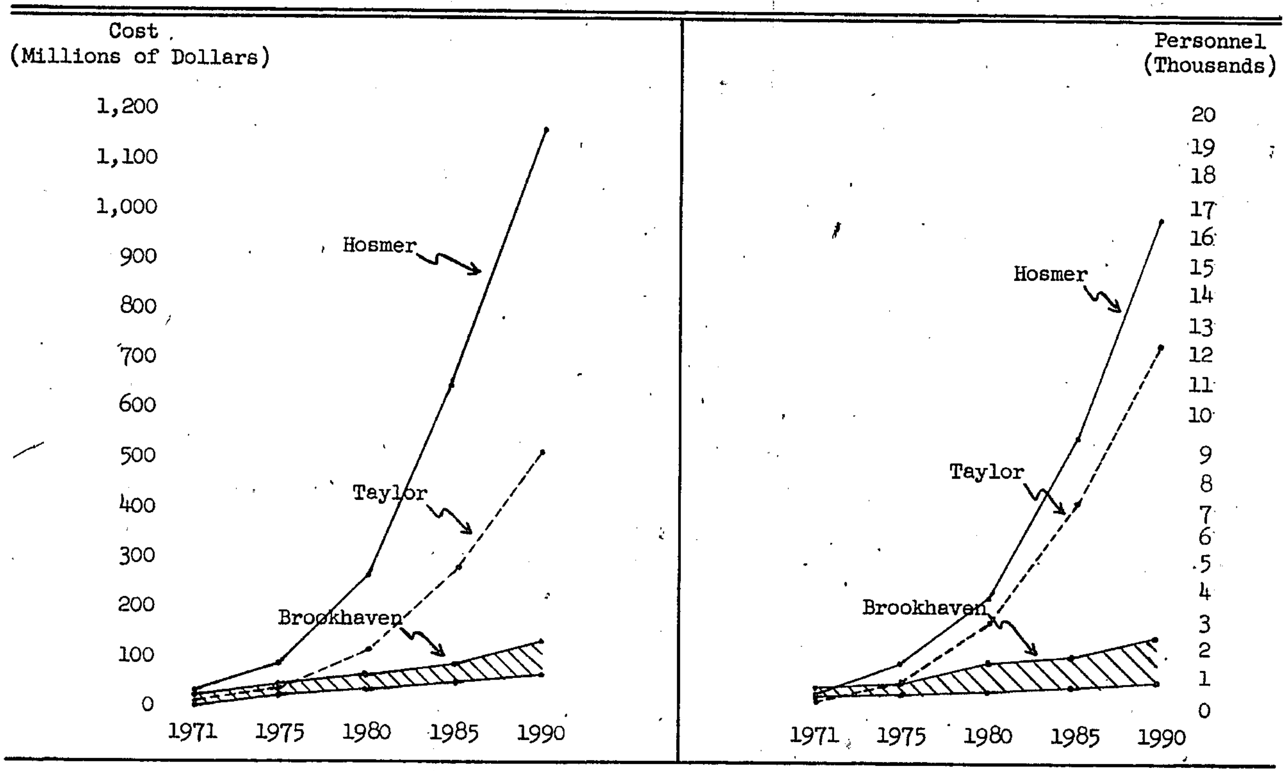
[b]Selected peaceful activities in NWS that are competitive with those in N-NWS.

[c]Relying on national inspection systems for remaining peaceful activities.

Source: Hearings before the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons, 90th Cong., 2nd Sess., Pt. 1 at 282 (1968).

CHART 7

IAEA INSPECTIONS: COST AND PERSONNEL REQUIREMENTS IN THE HOSMER, TAYLOR, AND BROOKHAVEN ESTIMATES



of the study are shown above. The Brookhaven figures are supported by one other recent estimate compiled by George Quester. Quester foresees an inspectorate staff of approximately 600 by 1973 and 800 to 1,000 by 1980.[1]

The discrepancies between these three cost estimates are great, as Chart 7 shows. The variables in a study of this sort are numerous and their relative impacts can only be approximated. Hosmer uses a basic cost estimate of $70,000 per year per inspector, and includes in his calculations a large allowance for research and development as well as a generous inflation factor. Taylor begins with a base of $40,000 annual expenditure per inspector, and prefers a more moderate allowance for research and development than does Hosmer. The Brookhaven study allots $25,000 per year per inspector, and $35,000 annually per headquarters staff member. Equipment costs are added separately. While Taylor includes no separate inflation allowance for his research and development estimate, the Brookhaven study figures in an inflation factor but no separate research and development investment. The Taylor and Brookhaven studies, furthermore, diverge on forecasts of the atomic industry growth rate and on development of multi-facility sites.[2]

The costs of international inspections, while they will surely rise if the NPT fulfills the task for which it was designed, do not seem prohibitive. Even Hosmer, an outspoken critic of United States' participation, could reasonably calculate only about $90 million for 1975 for enforcement of the

[1]George H. Quester, "The Nuclear Nonproliferation Treaty and the International Atomic Energy Agency," International Organization, XXIV (Spring, 1970), 173.

[2]For a more detailed comparison of the assumptions made by each study and the divergences among them, see the Hearings before the Senate Foreign Relations Committee on the Nuclear Nonproliferation Treaty, *op. cit.*, pp. 285-88.

agreement. Even his figure for 1990 of over $1 billion--and this includes a generous research and development plus inflation adjustment--is not unreasonable when considered in terms of the monumental defense budgets in the United States and the Soviet Union. The Brookhaven estimates, even those in Case A, seem miniscule by comparison. When one consideres that the costs of enforcement of the NPT will be shared by a considerable number of nations, it seems very difficult indeed to argue that cost will be a significant factor in the success or failure of the NPT inspection system.

The obstacle of clandestine diversion.--The inspection system provided for in the Nonproliferation Treaty is designed to prevent a maverick state from secretly contravening the nonproliferation agreement and diverting fissionable materials from ostensibly peaceful purposes to a weapons program. The NPT can not, of course, prevent absolutely the diversion of fissionable materials. As the Japanese case illustrates, civilian atomic energy programs are too widespread and continuous inspection too cumbersome to make certain that no group of individuals at no time or place can divert atomic energy resources to illegal uses.

The fact that the inspection system is not foolproof does not imply, however, that it will not inhibit illegal use of fissionable material. The purpose of inspection is not to prevent diversion *per se*, but rather to "embarass and deter violations"[1] should they be considered by errant national decisionmakers. Outside or "adversary" inspection by the IAEA, or some other similar non-partisan organization, of "strategic points" within national fuel cycles is being relied upon to achieve this goal.

The fabrication and reprocessing stages of the nuclear fuel cycle have

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[1]Quester, "The Nuclear Nonproliferation Treaty," *op. cit.*, p. 171.

been cited as the most critical "strategic points."[1] The fabrication stage is significant because of the need to maintain an accurate account of unprocessed scrap, or material unaccounted for (MUF), which could be used as a source of fissionable material for illegal diversion. Reprocessing is also a highly sensitive step. Not only must the diversion of materials through "official" channels be guarded against, but there is also the possibility that reclaimed plutonium could be stolen by political insurgents for guerrilla warfare, or even by gangsters motivated simply by monetary profit.[2] Close scrutiny of fuel reprocessing enables an inspector to keep track of the amount of new fissionable material that is separated from atomic waste and put back into the fuel cycle. Additionally, such inspection serves as a back-up check on reactor operations. By comparing the amount and enrichment level of the spent fuel taken out of the reactor with the amount and enrichment level of the fuel put into the reactor, a fairly accurate reading can be obtained on the amount and rate of fuel consumption in the reactor. Seals and identification numbers are considered useful in keeping track of reactor operations as well as transportation and storage facilities.

The inspection system, while imperfect, must be considered within the context of other restraints, technical and political, which serve to inhibit clandestine military use.[3] The cost in money and manpower alone would make

[1]Herbert Scoville, Jr., "Technical Capabilities of Safeguards," in Nuclear Proliferation: Prospects for Control, ed. by Boskey and Willrich, op. cit., pp. 57-61.

[2]James H. Boyd, "Theft of Fissionable Materials," in Inspection for Disarmament, ed. by Seymour Melman (New York: Columbia University Press, 1958), p. 119.

[3]See remarks on this point in Kramish, "The Watched and the Unwatched," op. cit., pp. 1-7; and Solly Zuckerman, "Technological Aspects of Proliferation," Adelphi Papers, No. 29 (October, 1966), 1-8.

a secret program difficult to conceal.[1] Any significant military program would require large investments of both, and these resources would have to come either from existing budgets and manpower reserves or from sources newly tapped. Large new tax increases and personnel recruitment drives would be difficult to conceal, while a siphoning off of money and manpower already in the national fiscal pipeline would require a decrease in goods and services to the private sector.

To the difficulties of building a nuclear force one can add the very severe problem of testing weapons and developing delivery systems. To be considered also is the rather intimate relationship that exists in the world community of atomic physicists.[2] Stringent personal security wraps, which

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[1]The costs of a hypothetical nuclear force of the type implied here is discussed at length in United Nations, Secretary-General, 18th Session, Oct. 10, 1967, Report of the Secretary-General on the Effects of the Possible Use of Nuclear Weapons and on the Security and Economic Implications for States of the Acquisition and Further Development of These Weapons, A/6858, pp. 31-39. For example, the Report estimates that "modest but significant nuclear armament" programs (thirty to fifty jet bombers, fifty medium range missiles, and one hundred plutonium warheads) would cost an average of $170 million per year over a ten year period. A "small, high-quality nuclear force" (ten to fifteen bombers, fifteen to thirty nuclear and thermonuclear warheads, one hundred IRBMs, and two missile launching submarines) would run in the neighborhood of $560 million per year over a ten year period. Some 20,300 people, including 5,500 scientists and engineers, would be required for the latter "high-quality" force.

[2]Gerald Zaltman has investigated this concept of a world community of physicists in "Scientific Recognition and Communication Behavior in High Energy Physics" (unpublished Ph.D. dissertation, Johns Hopkins University, 1968), pp. 37-45. He concludes that, while there do exist discernible geographical subsystems, a "single international social system" in high energy physics does exist. Zaltman measures this system on two dimensions, informal adviser/advisee contacts and formal research communication. Informal advisory relationships were determined by tabulating the percentage of cross-national linkages between advisers and advisees in terms of the nationality and country of employment of each. Japan was distinguished by the low level of informal linkages that existed between Japanese physicists in Japan and physicists of different citizenship (10%) or working in different countries (16%). In Japan, only 6 per cent of advisory relationships were international in terms both of citizenship and country of employment as compared with 17 per cent for the United States, 30 per cent for Italy, 44 per cent for Great

in themselves would require explanation, would have to be placed around the scientists and technicians engaged in a secret program. For Japan at least, where the democratic practice of questioning government policy is well entrenched, and where the demands for industrial and commercial atomic power are rising exponentially, to build a secret nuclear military force without arousing open protests from opposition political forces, the press, and civilian atomic power proponents, would require a national conspiracy of major dimensions. Thus, the possibility of secret diversion does not appear to be of sufficient danger to write off the NPT inspection system as it is presently conceived.

The obstacle of political acceptability.--The obstacles of cost and clandestine diversion do not seem sufficient to make or break the inspection formulas that are being devised under the NPT. Rather, it seems more likely that it will be the third consideration, the political acceptability of inspections to the nations whose task it will be to apply them, that will be the crucial factor in its success or failure.

Scheinman has suggested the difficulty the IAEA can expect to face when it attempts to act both in its statutory role as developer of atomic energy and its NPT role as policeman. The possibilities for conflict are numerous, especially in dealings with non-nuclear-weapon states which must submit to the inspections. When the IAEA is, in fact, called upon to investigate a

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Britain, and 46 per cent for West Germany.

Formal communications were measured by tabulating those individuals who were nominated as "research leaders" by individual physicists. Japanese physicists nominated physicists of non-Japanese citizenship in 55 per cent of the cases and physicists working outside of Japan in 41 per cent of the cases. Non-Japanese working outside of Japan were nominated 38 per cent of the time compared to 40 per cent for the United States, 65 per cent for Great Britain, 69 per cent for Italy, and 77 per cent for Switzerland. In both informal and formal communications, most of Japanese physicists' non-Japanese contacts were with the United States.

case of suspected diversion, it must act both as a fact-finding and as a quasi-judicial body, but without enforcement powers. Since the member states maintain physical control over atomic energy resources, any sanctions imposed by the IAEA Board will be effective only to the extent they are observed by the individual states. Moreover, since acts of non-compliance are referred to the U.N. Security Council, in the final analysis, legal enforcement of the NPT safeguard provisions, rests with the great powers.[1] China and France, neither of which have ahdered to the treaty, both hold veto power in the Security Council.

John Burton has said that "(I)t is not imaginative technical schemes for inspection of nuclear industries that are required, but the inclusion within a treaty of imaginative political provisions that remove the felt need for nuclear devices . . . ."[2] Imai Ryukichi, speaking for Japan, has likewise made the point that the function of inspections is to "detect and thereby deter . . .," not "to catch an act of diversion red handed . . . ."[3] For even if an act of diversion is uncovered, the offender will have to be dealt with by political means.[4] In other words, if the countries of the world desire the NPT to work, it will.

Current status of inspection agreements The latest IAEA inspection arrangements seem to be working more smoothly than before. While there is no prospect for immediate ratification of the NPT by Japan, the Atomic Energy

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[1]Scheinman, "Nuclear Safeguards, the Peaceful Atom and the IAEA," op. cit., pp. 43-48.

[2]Charles F. Barnaby, "The Role of Reactor Exporting Countries," in Barnaby, Preventing the Spread of Nuclear Weapons, op. cit., p. 206.

[3]Imai, "Safeguards: Five Views," op. cit., p. 6.

[4]Imai, "The Non-Proliferation Treaty and Japan," op. cit., p. 6.

White Paper for 1971 indicated that "(I)t can be thought that foundations have been laid for the equality of all nations concerning safety-guaranteeing measures . . . ."[1] In December, 1971 Prime Minister Sato indicated his hope for ratification in the "near future."[2] The JAEC, in releasing its revised 1972 atomic energy development goals, also endorsed ratification as quickly as possible.[3]

In April, 1972 the Nuclear Materials Control Center (NMCC) was established as the IAEA agent to apply safeguards in Japan. Its functions include nomitoring the use of radioactive materials, promoting technological development in the safeguards area, training specialists, and conducting public relations activities. The NMCC is to be run jointly by the STA, MITI, and private business. Its board of directors consists of three representatives from business circles (including the director), four from the government, and one from the academic community.[4]

Nuclear Disarmament and National Security

One other aspect of nonproliferation concerns Japan. That is the twin problem of nuclear disarmament and the security of the non-nuclear-weapon states. As in the case of inspection, Japan looks at the disarmament-security issue from the standpoint of a middle-sized power which feels threatened both by the reality of the superpowers' nuclear arsenals and the prospect that small, less stable regimes will acquire control over nuclear weapons. The

[1] Atomic Energy White Paper, 1971, trans. in SSJM, October, 1971, p. 3.

[2] The statement was made during the course of questioning before the Okinawa Reversion Agreement Special Committee. See the Tokyo Shimbun, Dec. 11, 1971 in DSJP, Dec. 14, 1971, p. 15.

[3] Japan Times Weekly, June 10, 1972, p. 9.

[4] Atoms in Japan, XVI (March, 1972), 10-11; and Atoms in Japan, XVI (April, 1972), 25-26.

government's concern was reflected in the Foreign Ministry's recent announcement that its U.N. Disarmament Office would be raised to "section" level. The Disarmament Office had been in existence since May, 1966 but had little apparent impact on policymaking. The new Disarmament Section was to be given responsibilities in the fields of nuclear and non-nuclear disarmament, as well as Asian regional disarmament policies.[1]

In March, 1971 the Japanese delegate to the Geneva Disarmament Committee proposed a three-point nuclear disarmament plan. First, all underground nuclear tests should be banned. Second, all testing of missiles for delivery of strategic nuclear weapons should cease. Third, part of the enriched uranium stockpiles in the United States and the Soviet Union should be converted to a low-enriched state of no military application, put under IAEA supervision, and then sold to non-nuclear-weapon states for peaceful uses.[2]

A ban on underground nuclear weapons testing was suggested some years ago by Alva Myrdal as part of a nonproliferation program.[3] Such a ban, it was felt, would act as a constraint on horizontal proliferation by the present nuclear-weapon powers, and would reduce the incentive of non-nuclear-weapon states to initiate nuclear weapons programs since they would be unable to test the reliability of those weapons. To accompany this, Myrdal suggested that the production of weapons grade fissionable material cease, thereby preventing the growth of existing stockpiles and the addition of new ones.

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[1] Nihon Keizai, Sep. 18, 1971 in DSJP, Sep. 23, 1971, pp. 27-28.

[2] Mainichi Shimbun, Mar. 5, 1971 in DSJP, Mar. 6, 1971, pp. 3-4.

[3] Alva Myrdal, "Political Aspects of Non-Proliferation," Adelphi Papers, No. 29 (October, 1966), 11-15. Morton Kaplan also feels a universal test ban is fundamental to the success of the NPT. See his discussion in "The Nuclear Non-Proliferation Treaty: Its Rationale, Prospects, and Possible Impact on International Law," in Great Issues of International Politics, ed. by Morton A. Kaplan (Chicago: Aldine Publishing Co., 1970), pp. 162-63.

Myrdal's proposal is quite similar to the three point Japanese nuclear disarmament plan noted above. The weakness of such proposals is the inspection system which accompanies them. Under the Myrdal plan, the IAEA would inspect (or internationalize) all exchanges of reactors and fuel, all plutonium separating plants, and all uranium gas diffusion and centrifuge facilities. Aside from Soviet objections to any international inspectors on their soil, and the exemption of military facilities from inspection that all nuclear-weapon states would be bound to demand, those non-nuclear-weapon states like Japan, which are running extensive commercial atomic energy operations, would object to any inspection procedures they felt might jeopardize their industrial secrets. Still, agreement on a comprehensive nuclear test ban, even without absolute verification methods, could go far in providing a solid foundation for strategic arms limitations, and at the same time, further the cause of nonproliferation by reassuring the non-nuclear-weapon states which have yet to ratify the NPT.

The linkage between the strategy of arms control and the strategy of nonproliferation has been examined recently in terms of the SALT I agreements reached at Helsinki. Proponents of arms limitations stress the likelihood that the non- but near-nuclear-weapon states will refuse to ratify the NPT without some evidence that the superpowers are moving toward arms reductions. Likewise, a comprehensive test ban, which would be the heart of any arms limitation agreement, would also go far toward reassuring the non-nuclear-weapon signatories of the NPT that vertical as well as horizontal proliferation was on the agenda of the nuclear-weapon states. In fact, some experts have suggested that a comprehensive test ban would be "more persuasive" to the non-nuclear-weapon states than strictly a limitation of armaments, since it would reduce the development of new nuclear weapons.[1] Herbert Scoville, Jr.,has noted, too, the very strong support in the United Nations for a resolution calling for a halt to all nuclear testing by August, 1973.[2]

Two developments, one political in nature and the other technical, have brought the possibility of a total nuclear test ban somewhat nearer than in the past. On the technical side, there has been a significant improvement in the ability of seismic devices to register shock waves over great distances and to distinguish earthquakes from shocks brought on by nuclear explosions. Two ranking Defense Department scientists recently testified before the U.S. Joint Committee on Atomic Energy that an underground test of any nuclear weapons inside China or the Soviet Union down to five kilotons in size could be detected by the United States.[3] Herbert Scoville, feels that such sensitive seismic instruments, together with the extremely sophisticated satellite photographic equipment now in use, gives the United States verification techniques "superior to our earlier capabilities, even combined with the on-site inspection we were seeking."[4]

Second, the political agreements reached in SALT I, especially the ABM treaty, have helped to outline more clearly the logical antecedents of a comprehensive test ban agreement. By limiting the number of anti-ballistic interceptor missiles in the United States and the Soviet Union to 200 each, the ABM treaty makes testing of new, improved defensive warheads unnecessary. Since the present ABM complement is incapable of withstanding any all-out

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[1]James J. Wadsworth and Jo Pomerance, "Total Test Ban," Washington Star, May 14, 1972, p. C2.

[2]Herbert Scoville, Jr., "After SALT, A Total Test Ban?" Washington Post, Feb. 4, 1973, p. C5.

[3]Washington Post, Oct. 28, 1971, p. A4.

[4]Scoville, "After SALT, A Total Test Ban?" op. cit., p. C5.

strategic attack, there is no justification by any standard of deterrence for continuing to improve the warheads on such ABMs. As for offensive weapons testing, Herbert Scoville points out that the United States has already declared it does not intend to pursue a MIRV program because of the likelihood that it would stimulate a new arms race with the Soviet Union. Scoville questions the value of MIRVs on purely technical grounds, and suggests that even a fivefold increase in the yield of offensive American nuclear missiles would be less important than improvements in accuracy.[1]

Agreement on a comprehensive test ban treaty is by no means a foregone conclusion. There is always the argument that secret tests could be conducted or that nuclear weapons could be stockpiled without testing. Probably no agreement will ever be foolproof, even with on-site inspectors. However, as in the case of the NPT inspection system, the test of a workable agreement is to reduce the possibility of secret contravention of rules to the lowest possible level. There is a growing body of opinion which feels that with a combination of seismic devices, photographic equipment and possibly mechanical sensors located on the territory of the respective parties, the degree of confidence in a monitoring system will be sufficiently high so that a test ban agreement can be reached.

The danger that the strategic balance can be upset without testing is an argument that has sometimes been used against such test bans. The possibility is always there, but there are also arguments which suggest that the danger is not so serious as is sometimes suggested. Such weapons would be of unknown reliability at best, and while incremental improvements might be made on existing weapons systems with some degree of confidence, each step of development leading away from tested and proven technology would

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[1]Scoville, "After SALT, A Total Test Ban?" op. cit., p. C5.

increase their degree of unreliability in ever larger amounts. One must also take into account the motivations of each side to reach an agreement. With the NPT, SALT I, the strict observance of the atomspheric test ban, and talks about mutual and balanced force reductions in Europe, there appears to be a genuine desire on bothssides to reduce the level of strategic tension. The reticence of the non-nuclear-weapon states on the NPT, which both superpowers haveeindicated they value very highly, should encourage them to lower their resistence to a comprehensive test ban agreement if it appears that the NPT can be had only at this price.

Japanese uneasiness over the growing amounts of fissionable materials in circulation is not confined to the activities of the present nuclear-weapon countries. In a recent article, Imai Ryukichi expressed concern over the prospect that sophisticated tactical nuclear weapons may find their way into inexperienced hands. He suggested that the nuclear-weapon states discontinue production and testing of small weapons, and tighten controls over the weapons presently in existence. In addition to fears that tactical nuclear weapons might sometime be distributed to non-nuclear-weapon states as a policy maneuver by the superpowers, there is the possibility that guerrilla or terrorist groups could hijack such weapons. Imai called for emphasis at the highest policy levels on control of "small bombs possessed by small countries."[1]

The NPT on Balance

The Nonproliferation Treaty is a mixed bag from the Japanese standpoint. While they might have preferred to shorten the twenty-five year span of the

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[1] Ryukichi Imai, "Changing 'Nuclear' Weapons and Disarmament Thought," Jiyu (July, 1971), trans. in SSJM, December, 1971, pp. 1-10. See also, Deborah Shapley, "Plutonium: Reactor Proliferation Threatens a Nuclear Black Market," Science, CLXXII (April,9, 1971), 143-46.

treaty, liberal provisions for renegotiation, a veto on amendments, and a three-month escape clause gave the Japanese about all they expected on this score. The NPT does not appear to threaten in any way Japan's position in the forefront of civilian reactor development. Between widespread exchange agreements with other countries and a growing technological complex at home, Japan seems likely to keep pace. The only serious concern that could arise would be as a result of a technological breakthrough in peaceful atomic explosions. Inspection, too, seems to be progressing favorably. With time and experience, it appears that workable compromises can be reached.

The fact remains that the Japanese government signed the Nuclear Nonproliferation Treaty in 1970 in the face of solid rejection of the agreement by all the opposition political parties. Within the ruling Liberal-Democratic Party, as well, there were serious reservations as to the wisdom of the move. The Japanese atomic industry, although throwing its general support behind the government, has been alert to any derogative effects the NPT might have on domestic atomic energy development. Finally, even those Cabinet members who spearheaded the political drive for signing have been most guarded in their advocacy.

At the moment, most Japanese leaders, and certainly the public at large, enthusiastically support the primary objectives of the Nonproliferation Treaty. Whether Japan will consummate its signing of the NPT by legislative ratification and then continue to support it will depend on whether or not the reservations discussed here are met to the satisfaction of those concerned. Disarmament and security pose the most intractable problems. Japan clearly lost on the former. Whether nuclear disarmament will proceed on other tracks remains to be seen. SALT II should clarify the picture. Japanese security has been affected little, for the moment, by the NPT.

The strategic balance is much the same as it was before. However, as political and economic relationships change among major international actors, as they have begun to do, security concepts also change along with them. Japanese apprehensions are shared by the other non- but near-nuclear-weapon states, and while ancillary to the actual content of the NPT, they are basic to its intent and crucial to its success.

CHAPTER IX

INTERNATIONAL LINKAGES: NATIONAL DEFENSE AND INTERNATIONAL SECURITY

Now that Japan is rapidly outgrowing the postwar syndrome which kept it isolated on the rim of East Asia, the question of a resurgence of Japanese military power, especially nuclear military power, has come to the fore. There have been any number of predictions that Japanese nuclear rearmament is probable, or even inevitable.[1] Other forecasts argue just as strongly the reverse, and cite a four or five point litany to prove the unlikelihood of any such reversal of present defense policy by Japanese decisionmakers.[2] The merits of both viewpoints notwithstanding, discussion of the question of nuclear rearmament is no longer taboo in Japan. The time when a statement by a foreign journalist that Japan would soon have nuclear arms could bring forth an official denial from the Japanese Foreign Ministry is long past.[3] The issue has emerged from behind closed ministry doors, and is now being debated openly by the press and public today.

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[1]See, for instance, W. W. Rostow in the New York Times, Sep. 22, 1970, p. 45; Leonard Beaton, "Nuclear Proliferation," Science Journal, III (December, 1967), 38; Martin Weinstein, "Strategic Thought," in Forecast for Japan: Security in the 1970s, ed. by Morley, op. cit., p. 84; and Herman Kahn, The Emerging Japanese Superstate (Englewood Cliffs, N.J.: Prentice-Hall), pp. 10-13, 165-68.

[2]Typical is a recent article by Wakaizumi Kei who argues that Japan will not go nuclear because of (1) its strategic vulnerability, (2) the lack of domestic uranium ore deposits, (3) the expense of a second strike capability, (4) foreign opposition, and (5) public opposition. See his article entitled "Japan's Role in a New World Order," Foreign Affairs, LI (January, 1973), 310-15.

[3]Harrison Salisbury, New York Times, Aug. 19, 1966, p. 1; and Japanese rebuttal, Aug. 26, 1966, p. 5.

A full investigation of the entire issue-area of Japanese defense strategy and rearmament is beyond the scope of this paper. The question of nuclear weapons, and of their relationship to Japan's peaceful atomic energy program, is germane, however. The following discussion will focus first of all upon the coextensive nature of civilian and military atomic energy development, and the implications that a national reactor development program can have for nonproliferation. Next, a summary look will be taken at the context within which the strategic debate over nuclear rearmament is taking place. Consideration will be given to official policy statements and to the nature of public opinion on this issue. Finally, Japan's nuclear option will be analyzed in terms of the relative value of a nuclear weapons force and alternative non-nuclear defense strategies.

The Military-Civilian Nexus

The greatest irony of atomic energy is that the technology of the peaceful atom can so readily be turned to military purposes. Even without the slightest desire to build up a destructive capability, the country that pursues the power locked in the atom finds that the very technology which holds forth such great potential for solving man's age old problems of survival is replete with the capacity for man's destruction. There is no avoiding the fact that "innocent progress toward the bomb"[1] will continue to proceed apace with civilian atomic energy development.

Aside from the research advances and training skills that a sophisticated civilian program affords, one of the most basic and, in the case of Japan, most critical linkages between atomic reactors and atomic

[1]The term is used by George H. Quester, "Some Conceptual Problems in Nuclear Proliferation," American Political Science Review, LXVI (June, 1972), 491.

bombs is the production of weapons fuel. As a result of nuclear fission inside a reactor, there is an accumulation of plutonium as valuable an atomic fuel as the original uranium from which it came. One of the most highly publicized features of atomic reactors is this ability to produce new fuel from old, or spent, fuel. Ultimately, the fast breeder is expected to produce more fuel than it burns. In the technology of the fuel cycle, there is nothing to prevent this reactor by-product from being applied to the manufacture of weapons. Thus, there stems from commercial electric power operations military and political ramifications of the highest strategic significance.

The Tokai reactor, Japan's first commercial power reactor, has an estimated plutonium producing capacity of three to ten kilograms annually as the result of normal operations. If diverted from its primary purpose of generating electrical power, the Tokai reactor is reportedly capable of producing up to 240 kilograms of plutonium annually through incomplete burning of its uranium fuel element.[1] The Japan Defense Agency estimates that this Tokai plutonium is sufficient to arm twenty Hiroshima-class bombs (20,000 kilotons of TNT) per year, if the reactor were turned over solely to this purpose.[2] Unofficial estimates of the Tokai reactor's capacity range from twenty to thirty-two bombs per year.[3] The Tsuruga reactor, with approximately twice the capacity of the Tokai, is estimated to have a

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[1] Tokyo Shimbun, Feb. 28, 1967 in DSJP, Mar. 2, 1967, pp. 17-19; Yomiuri Shimbun, Feb. 14, 1968 in DSJP, Feb. 27, 1968, pp. 35-37.

[2] See the JDA's Security Research Council report entitled "The Security of Japan and Prospects for 1970, 1968 Issue," in the Mainichi Shimbun, July 12, 1968 in DSJP, July 12, 1968, p. 20.

[3] Yomiuri Shimbun, Feb. 14, 1968 in DSJP, Feb. 27, 1968, pp. 35-37; and Leonard Beaton, Must the Bomb Spread? (Baltimore: Penguin Books, 1966), p. 94.

plutonium production capacity of sixty bombs annually.[1] Reactors already under construction will have a power output capacity nearly two and a half times that of the Tsuruga, while the output of those planned for the latter half of the 1970s will be easily three times and more. On the international level, Skolnikoff estimates that by 1980 enough plutonium will be produced by atomic reactors to make 10,000 warheads per year.[2] The International Peace Research Institute in Stockholm has pointed out that by that date one-third of the world's plutonium will be owned by the present non-nuclear-weapon states; enough, its recent study concluded, to produce 100 Hiroshima-class bombs per week.[3]

The interface goes beyond simply reactor technology and, indeed, encompasses the entire nuclear fuel cycle. From mining, through fabrication and enrichment, during the reactor stage, and finally reprocessing, the bank of technology that is accumulating daily can be used to underwrite either path, whichever is determined politically. Increasingly this will be so. Willrich states that plutonium technology, so critical to future generations of commercial reactors, is widespread, and that "military significant amounts" can be obtained from facilities costing "well under $100 million" and with operating costs under $10 million per year.[4] Gilinsky has also written of

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[1] Beaton, Must the Bomb Spread?, op. cit., p. 94.

[2] Eugene B. Skolnikoff, The International Imperatives of Technology: Technological Development and the International Political System (Berkeley: University of California, 1972), p. 66, citing Neville Brown, "Plutonium and Poverty," New Scientist, XLV (January, 1970), 13.

[3] Andrew Wilson, "Nuclear Capability Spreads," Washington Post, July 13, 1972, p. E9, quoting the World Armaments and Disarmament Yearbook--1972.

[4] Mason Willrich, "The Treaty on the Non-Proliferation of Nuclear Weapons: Nuclear Technology Confronts World Politics," The Yale Law Journal (July, 1968), 1454.

future high temperature-gas cooled reactors which may burn highly enriched uranium rather than the low enrichment fuel currently called for by enriched fuel reactors. The creation of a legitimate commercial need for highly enriched uranium, which today has only military applications, would only strengthen the troublesome civilian-military linkage in this area.[1]

The problem of proliferation is often discussed solely as a military question, but as Quester noted, there is a great deal of ambiguity in asking simply "how close" country X is to making a bomb. The time lag between a political decision to embark on a nuclear weapons program and the point at which such weapons are operational is a question of technological ability and motivation, and should be included in estimates of political and military factors.[2] There is no question but that civilian power reactor programs are reducing this time lag dramatically by expanding the stock of atomic energy facilities and equipment, building up an atomic energy related commercial and industrial infrastructure, producing a sophisticated bank of data and corps of trained personnel, and educating the public in the practicalities and politics of the atom.

Japanese Security and the Nuclear Debate

When, in 1945, the Japanese Empire surrendered, its military arm was dismantled. The sincere welling up of pacifist sentiment after the defeat was reflected in the 1947 Constitution in which war, as well as forces to wage war, was forever renounced. Whatever the original intention of the drafters may have been, the onset of the cold war made it impossible in

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[1]Victor Gilinsky, "Military Potential of Civilian Nuclear Power," in _Nuclear Proliferation: Prospects for Control_, ed. by Boskey and Willrich, _op. cit._, p. 50.

[2]Quester, "Some Conceptual Problems in Nuclear Proliferation," _op. cit._, pp. 491-92.

practice for Japan to exist without some form of security force. The National Police Reserve Force was established in 1950, and debate over the legality of the Self-Defense Forces, as the Japanese military establishment came to be known, has been waged continuously in Japan since that time. Although a vocal political opposition, with a significant element of public backing, claims that all weapons are prohibited by the Constitution, the war clause has never been reviewed by the Supreme Court, and all post-war governments have insisted that self-defense is an inherent right of sovereignty. The obligation to maintain military forces exists, they feel, pursuant to that end.[1]

Nuclear defense and the Constitution The legality of a Japanese nuclear force within the constraints of the "Peace Constitution" is a moot point. Since the 1950s, however, succeeding Japanese governments have ascribed to themselves the authority, deriving from their responsibility for national defense, to decide on the use or non-use of nuclear weapons as a matter of policy. This decisionmaking authority is usually hedged by the explanation that such weapons shall be uniquely defensive in character. Since weapons technology has so far provided no hard and fast rules for distinguishing defensive from offensive weapons, the practicality of such stipulations may be questioned.

The matter was first raised publicly in 1955 by Prime Minister Hatoyama who indicated he would approve the introduction of nuclear weapons into Japan if "absolutely necessary" for Japan's defense.[2] Under Prime Minister Kishi

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[1]The debate over defense and the Self-Defense Forces is treated at length in Kim, Major Issues of Japan's Security Policy Debate, op. cit., passim.

[2]Yomiuri Shimbun, Feb. 10, 1968 in DSJP, Feb. 14, 1968, p. 1.

the political guidelines which all succeeding governments have adhered to since were formulated. In 1957, during a debate over Article IX (prohibition of war making power), Kishi declared that "not all nuclear weapons can be considered as falling within the purview of this prohibition. If there is a nuclear weapon that can be considered as solely a defense weapon, it is not outside the realm of possibility for Japan to possess it."[1] Some time later he reiterated that "Japan can possess small-sized nuclear weapons for self-defense purposes according to the Constitutional interpretation." However, he added, "as a matter of actual policy, the Government takes the stand of not acquiring any type of nuclear weapons."[2] Kishi was supported in his interpretation of the Constitution by former Prime Minister Yoshida.[3]

Conservative governments since that time have done their best to downplay the nuclear rearmament question for there is sizeable opposition to any such move within the LDP itself, not to mention the opposition parties and the public at large. Nevertheless, the issue always lies just beneath the surface. It arose inevitably during debate on the Japanese-Korean Peace Treaty in 1965,[4] and again over the reversion of Okinawa.[5] When the issue came up once more during debate on the Nonproliferation Treaty, the LDP reportedly considered making some formal adjustment of its stand on nuclear weapons. Party leaders met in December, 1967, but decided against any

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[1]Kei Wakaizumi, "Four National Debates: The Problem for Japan," in A World of Nuclear Powers?, ed. by Alastair Buchan (Englewood Cliffs, N.J.: Prentice-Hall, 1967), p. 78.

[2]Mainichi Shimbun, Mar. 13, 1959 in DSJP, Mar. 13, 1959, p. 15.

[3]New York Times, Aug. 2, 1959, p. 20.

[4]Wakaizumi, "Four National Debates: The Problem for Japan," in Buchan, A World of Nuclear Powers?, op. cit., p. 78.

[5]Mainichi Shimbun, Feb. 6, 1969 in DSJP, Feb. 7, 1969, p. 31.

public disclosure of their discussions since the military issue was so sensitive, and because they did not wish to widen the fissure which was known to exist within the party on the nuclear question.[1]

The debate continued after Prime Minister Sato's return from discussions in Washington with President Johnson, and there was much speculation on the exact meaning of Sato's references to "autonomous defense" and his talk of encouraging in the Japanese people, "a spirit of defending the country by themselves."[2] During questioning at the House of Representatives Budget Committee hearings in February, 1968, the Prime Minister explained the "four pillars" of his nuclear weapons policy. The first pillar encompassed the three non-nuclear principles (no production, no possession, no introduction) which had guided the atomic energy program in Japan since 1956. The second pillar called for the total elimination of nuclear weapons, the third supported the peaceful development of atomic energy, and the fourth placed reliance on American deterrent power for defense against nuclear attack.[3]

The potential conflict between pillars one and four did not escape the attention of the opposition members in the Diet, and questions were addressed to this point. The three non-nuclear principles, Sato's first pillar, were "based strictly on the premise that the U.S.-Japan Security Treaty setup is working," Chief Cabinet Secretary Kimura stated.[4] Another "Government source" explained that without the Security Treaty "the three nuclear

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[1] Sankei Shimbun, Dec. 14, 1967 in DSJP, Dec. 15, 1967, p. 41; and Asahi Shimbun, Dec. 18, 1967 in DSJP, Dec. 19, 1967, p. 7.

[2] Yomiuri Shimbun, Feb. 29, 1968 in DSJP, Mar. 13, 1968, p. 14.

[3] Asahi Shimbun, Feb. 6, 1968 in DSJP, Feb. 6, 1968, p. 7.

[4] Yomiuri Shimbun, Feb. 7, 1968 in DSJP, Feb. 7, 1968, p. 28.

principles will lose their meaning as the first pillar."[1] If there was still any doubt about the relative weight attached to the two "pillars," it was cleared up by a "high-ranking Foreign Ministry official source" who stated that "(A)mong Prime Minister Sato's four nuclear policies, including the three non-nuclear principles, nuclear deterrent power takes precedence over the other three policies."[2]

The opposition parties within the Diet were not reassured by the explanations they received, and they attempted, without success, to pass the three non-nuclear principles in the form of a Diet resolution.[3] The ramifications of a nuclear defense force were explored at length in the Diet and in the press for the next several years as Okinawan reversion and the Security Treaty came up for consideration. The government's position has remained unchanged, as the 1970 Defense White Paper makes clear,[4] and the question of a nuclear weapons force is still treated as a matter of Cabinet policy.

The strategic setting Postwar Japanese strategic defense policy has been shaped by the realities of the Soviet-American overall strategic military balance. As Weinstein points out, Japanese defense planners realized they could not defend the country against either of the superpowers. They were convinced, however, that the United States could defend Japan against the Soviet Union. The reverse was not true.[5] Thus, Japan had no alternative to

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[1]Mainichi Shimbun, Feb. 7, 1968 in DSJP, Feb. 7, 1968, p. 31.

[2]Yomiuri Shimbun, Feb. 8, 1968 in DSJP, Feb. 9, 1968, pp. 15-16.

[3]Tokyo Shimbun, Mar. 7, 1968 in DSJP, Mar. 8, 1968, pp. 1-3.

[4]Nihon Keizai, Nov. 1, 1970 in DSJP, Nov. 6, 1970, p. 41.

[5]Martin E. Weinstein, Japan's Postwar Defense Policy, 1947-1968 (New York: Columbia University Press, 1971), pp. 134-35.

a close defensive alliance with the United States.

This defensive alliance is still the keystone of Japanese defense strategy. Today, however, the security relationship is undergoing change. Until Japan and the United States both decide just what their respective roles in Asia are to be, the future of their security relationship will be uncertain. A wholesale American withdrawal from Asia would certainly precipitate a decision on a Japanese nuclear weapons force, and it seems probable that without the American nuclear umbrella the decision would be to exercise the nuclear option. Such a complete American withdrawal does not appear likely, although the United States is encouraging its Asian allies, Japan included, to assume a greater share of their own defense burdens. Whether this will mean a national nuclear force for Japan will depend to a large extent on what understandings are reached between the United States and China, and to a lesser extent between the United States and the Soviet Union.

Because of the uncertain nature of this three-way relationship, Japanese perceptions of American intentions are very important to the course of Japanese nuclear policy. The requisite understandings which would serve to produce a stable nuclear equilibrium between Japan's nuclear-armed neighbors would not necessarily add up to increased security for Japan. As the debate over the Nonproliferation Treaty has shown, the strategic deadlock which has given a certain degree of stability to relationships between the nuclear superpowers has not resolved the question of credible nuclear guarantees for non-nuclear-weapon states. An American-Chinese "no first use" agreement, for example, would not erase the latent Chinese nuclear threat to Japan. If the Japanese feel most threatened by the Chinese nuclear force, and if the U.S.-Japan Security Treaty is to continue to serve as an alternative to a Japanese nuclear weapons force, Japan will have to feel certain that its regional security interests are not to suffer as a result of larger global understandings between the major nuclear states.

Overall, the tensions which have arisen between Japan and the United States appear to stem asmuch from general differences in perceptions of respective roles than from specific policy questions. In an extensive 1968 survey of Japanese parliamentarians and the public at large, unfavorable references to the United States were most often phrased in terms of "Japan is too dependent on the U.S.," "the United States does not understand Asia and Asian problems," or "the United States lacks understanding of Japan." Only 3 per cent of the public and 9 per cent of parliamentarians cited Vietnam specifically, for instance. Parliamentarians were about equally divided as to whether they wished to see the United States become more involved with Asian problems (apart from Vietnam), while 43 per cent of the public answered "Don't Know." Still, 35 per cent of the public chose the United States as the actor with which Japan should cooperate the most closely. Only 10 per cent selected China and 4 per cent the Soviet Union. Parliamentarians, too, picked the United States as the most desirable partner far above any other country (63%).[1]

Those who wished for greater American involvement or had favorable attitudes toward the United States mentioned economic and military security relationships most frequently as the reasons for their positive attitudes. In a 1971 Asahi poll, respondents were asked to list their negative and positive reactions to the United States. The two largest blocs of answers were both positive. This approval was based on the perception that American

[1]Lloyd A. Free, International Attitudes in Four Asian Democracies (Princeton: Institute for International Social Research, 1969), pp. A-11, A-12.

"science and technology are highly advanced" (33%) and that the United States is "materially affluent" (29%).[1]

While there exists strong sentiment in Japan in favor of continuing a broad cooperative association with the United States, this relationship does not exist in a vacuum. Japanese nuclear policy, in particular, will be shaped very much by the trend of Sino-American and Sino-Japanese relations. At present, as Young has suggested, the United States serves as a buffer for Japan as it sets about establishing a new relationship with China and the Soviet Union.[2] The search for new policy courses on the Asian continent has been given a certain flexibility by the strategic guarantee afforded by the United States.

How long and to what extent this flexibility can be retained in view of the Chinese-American detente will be the central concern of Japanese strategic defense planning. Since the success of both American and Japanese overtures to China will depend to a considerable extent on the nature of the strategic Japanese-American understanding, both the United States and Japan will be seeking to adjust that relationship in terms of their respective policy objectives _vis a vis_ the Chinese. Such adjustments will necessarily be subtle and can be successful only if Japan is convinced that the accommodation between the United States and China is not to be bought at the price of an American strategic withdrawal from Japan. For the time being, at least, the Chinese do not appear to be seeking to exact such a price. In the meantime, as Skolnikoff suggests, "(T)he course of Sino-Japanese relations is likely to be the most important determinant of Japan's intentions with

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[1] _Asahi Shimbun_, June 3, 1971 in _DSJP_, June 4, 1971, p. 5.

[2] Kenneth T. Young, "Japan and the United States in Pacific Asia," _Pacific Community_, IV (October, 1972), 5.

regard to nuclear weapons, since a U.S. nuclear guarantee will be less credible as time goes on, and less politically acceptable to either Japan or the U.S."[1]

Sino-Japanese relations have been complicated by the emergence of a Chinese nuclear striking capability which has made the strategic balance in East Asia considerably more fluid than in the days before China had the bomb. The Chinese have challenged post-war Japanese defense thinking in two ways. First, Chinese nuclear weapons transformed the nature of the Chinese threat to Japan quite dramatically. Traditional Chinese land, sea, and air forces were thoroughly defense oriented. Separated from Japan by hundreds of miles of ocean and with scant logistical capability, they presented no immediate physical threat. Chinese missiles with nuclear warheads completely altered these complacent attitudes about time and space.

Imai Ryukichi has explained why Chinese missiles are so unsettling to the Japanese. For one thing, Chinese nuclear weapons are an affront to the global strategic condominium which the United States and the Soviet Union have forged since 1945 and, as such, potentially destabilizing. There has been a mutual inability to calculate rationally a hierarchy of threats and counterthreats, and this has lent Chinese forces a peculiarly unsettling character in a world grown used to living with a closely regulated "balance of terror." For another thing, the Japanese are uncertain as to the ultimate goal of the Chinese nuclear force--purely defensive, dominance in East Asia, or superpower status. As the only nuclear power whose interests are centered in Asia, the extent of Chinese ambitions is most important to Japanese

[1] Skolnikoff, The International Imperatives of Technology, op. cit., pp. 179-80.

defense planners.[1]

Despite these misgivings by Japanese defense strategists, however, the Japanese in general do not have a clear image of the role China will play in Asia or of just what Japan's response should be to Chinese initiatives. The 1968 opinion poll mentioned above revealed that 41 per cent of the public and 74 per cent of Japanese parliamentarians felt that China would not come to dominate other Asian countries.[2] There was considerable support among the public (39%) and parliamentarians (45%) for "joining with other non-communist Asian countries to further mutual development and balance Chinese power," but such groupings were thought of almost exclusively in terms of economic, political, and cultural competition, rather than a military counterbalance.[3] On both questions, fully half of the public answered "Don't Know." A poll taken in January, 1973 also revealed nearly 52 per cent of the public still were reserving judgment when asked whether they had a favorable or unfavorable image of China. But while 52 per cent would not choose either side, over 35 per cent had a favorable or very favorable response. Less than 8 per cent rated China unfavorably.[4]

The Chinese, who used to rail against the resumption of Japanese militarism, have lately begun to take a much more conciliatory approach toward Japan. Chou En-lai has even suggested that Japan will need to retain the American nuclear umbrella for the time being as protection against the

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[1] Imai, "Changing 'Nuclear' Weapons and Disarmament Thought," op. cit., pp. 2-3.

[2] Free, International Attitudes, op. cit., p. A-50.

[3] Ibid., pp. A-35, A-36.

[4] Tokyo Shimbun, Jan. 4, 1973 in DSJP, Jan. 13/16, 1973, p. 7.

Soviet Union.[1] It is in China's interests, its leaders now evidently believe, to keep an American counterweight to Soviet ambitions in Asia. In addition, the American nuclear guarantee to Japan also provides the best insurance against the development of a Japanese nuclear force.

Much of the present "smile diplomacy" being directed toward Japan is obviously aimed at driving a wedge between any too close alignment between Japan and the Soviet Union. However, apart from the Sino-Soviet struggle, both Japan and China have much to gain in other respects from closer relations with each other. A number of long term economic and technical exchange measures are now under discussion, and already Japanese factories and technological know-how are being exchanged for Chinese oil and other raw materials to feed Japanese industry. The Chinese are also negotiating with the Tokyo Electric Power Company for technical assistance in building atomic power plants.[2] Even Taiwan, which has frequently been cited as a potential troublespot between the two countries, may turn out to have just the opposite effect. As John Welfield notes, the Taiwan clause in the Nixon-Sato communique of November, 1969 has been set aside by more recent developments between the United States and Japan on the one hand and China and the other. Also, Chou En-lai has promised that Japanese economic interests will not be endangered once Taiwan is reunited with the mainland.[3] Selig Harrison even speaks in terms of a future economic condominium in Taiwan. He notes that the critical Senkaku Islands issue was not raised publicly during Tanaka's visit to Peking, and suggests that the fact that certain Tokyo investment

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[1]Washington Post, Jan. 19, 1973, p. A1.

[2]Selig S. Harrison, "China and Japan: The New Asian Partnership," Washington Post, Mar. 4, 1973, p. B5.

[3]John Welfield, "A New Balance: Japan Versus China," Pacific Community, IV (October, 1972), 66-67.

bankers are now seeking "instructions" from Peking prior to any further investment in Taiwan is evidence of an understanding between Japan and China on future joint economic development of the island.[1]

The trade patterns that develop will have certain political ramifications. One effect of closer economic collaboration with China might be to reduce pressure on Japanese governments at home from the left wing. There was a good deal of resentment in Japan over the fact that the United States accomplished its opening with China without prior consultations with its Japanese allies. Japanese governments will be under strong pressure from now on to keep one jump ahead of the United States in China, and as David Brown has pointed out, expanding trade relationships with the mainland is one way to accomplish this.[2] Much in the emerging partnership is still speculative, however, and the Foreign Ministry has expressed concern over investing too deeply in China lest Japan be drawn too closely to the Chinese at the expense of the promising relationship with the Soviet Union.[3]

At the moment, Japan is passing through a state of "ambivalence between rivalry and cooperation" with Peking.[4] There is the potential for considerable economic cooperation between the two countries, especially if Japan begins to run into trade and monetary problems with the United States and Western Europe. Also, if Japan comes to feel that relations with China have truly stabilized, the urgency with which some Japanese have viewed the

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[1]Selig S. Harrison, "Japan, China Agree on Taiwan Dealings," Washington Post, Feb. 26, 1973, p. A1.

[2]David G. Brown, "Chinese Economic Leverage in Sino-Japanese Relations," Asian Survey, XII (September, 1972), 669-71.

[3]Harrison, "China and Japan: The New Asian Partnership," op. cit., p. B5.

[4]Young, "Japan and the United States in Pacific Asia," op. cit., p. 10.

course of Japanese nuclear defense policy may subside. If Japan can reassure itself that China harbors no aggressive impulse against a non-nuclear-armed Japan, the need to make a decision on the nuclear option may be postponed indefinitely.

On the other hand, as Chinese foreign trade begins to expand there is a strong possibility that Japanese export goods will have to compete with Chinese exports in Asian markets that have long been dominated by Japan. Whether a division of the market can be reached that will satisfy both parties is a moot point. Also, there is no guarantee that Japanese exporters will not become disillusioned with their investments in China if they find that they are subjected to stiffer bargaining and fewer profits than they have come to expect in their dealings with other Asian countries. For the time being, Japan will probably be most concerned, as Harrison suggests, with preventing a "destructive rivalry with China for regional supremacy"[1] while laying the groundwork for future cooperation. So long as the present optimistic mood continues, it appears doubtful that the Japanese government will make any overt move with respect to a Japanese nuclear force which would jeopardize what could turn out to be a highly satisfying relationship between Japan and China.

Chinese nuclear weapons have challenged Japanese defense strategy in a second way, also. While debate continues over whether Japan should respond to the Chinese nuclear force in kind, the presence of a Japanese nuclear force must also be assessed in terms of Japan's position _vis a vis_ the Soviet Union. What the Japanese must determine is whether traditional post-war defense doctrine, _i. e._, that Japan alone can defend itself against neither of the superpowers, but that the United States can defend Japan

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[1]Selig S. Harrison, "Japan, Inc.: Tempering Its Asian Goals," _Washington Post_, Feb. 25, 1973, p. C1.

against the Soviet Union, is still valid. Weinstein suggests that the debate over the Nonproliferation Treaty in the LDP on whether or not to retain a nuclear option for Japan stems from the larger dispute over whether Japan can conceivably defend itself against the Soviet Union.[1]

Any Japanese nuclear weapons force, even though its announced raison d'etre might be to counter a Chinese threat, would automatically call forth a strategic response from the Soviet Union. Whether Japan could create a credible nuclear deterrent to the Soviet Union, in view of its obvious military inferiority and exposed civilian population, will have to be decided before the issue of nuclear rearmament can be resolved. A Japanese nuclear force would also require reexamination of the assumptions upon which the Japanese-American defense relationship is based. What credibility American nuclear support would have for Japan in the context of a Soviet-American strategic balance complicated by a Japanese nuclear force and Chinese ICMBs is for Japanese planners to ponder.

Clearly, part of the Soviet interest in Japan stems from the improved state of relations between Japan and China. Japanese-Soviet relations had been at a low ebb since Foreign Minister Miki's visit to Moscow in 1967. Suddenly, in January, 1972, with Foreign Minister Gromyko's visit to Tokyo, high level discussions began once again. In October, Foreign Minister Ohira was in Moscow, and in March, 1973 Prime Minister Tanaka announced that Japan was prepared to enter into constructive talks over the Siberian development project which the Soviets had been pushing.[2]

The Soviet new look in Asian diplomacy was first outlined in June, 1969

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[1]Weinstein, "Strategic Thought," in Forecast for Japan: Security in the 1970s, ed. by Morley, op. cit., p. 82.

[2]Washington Post, Mar. 7, 1973, p. A24.

in a call for an Asian collective security system. Although the proposal was not followed up at the time, it has recently been introduced publicly again. The details of the proposal have never been made clear, although in general terms the Soviet Union has called for the non-use of military force in Asia, respect for national sovereignty and territory, non-interference in domestic politics, and mutual economic development. Some Japanese observers have suggested that its major purpose was to enlist Japan as a counterweight to China after the the Chinese-American rapprochement.[1] Since the Soviet Union has unsettled border disputes with both Japan and China, one objective may have been to settle the Japanese boundary issue within the context of the proposed Asian security system, and thereby gain tacit Japanese acknowledgement of Soviet claims in its border dispute with China. Since 1956 the Soviets have offered to negotiate the boundary dispute with Japan on the basis of returning only Habomai and Shikotan to Japan, while retaining control over Kunashiri and Etorofu. The Japanese, however, have always refused to consider anything less than the return of all four islands. Japanese political parties have been united in their demands for return of all these pre-war territorial possessions, and it does not appear likely that the boundary issue will be permanently settled on any other terms.

In another area, mutual economic development, there has been more progress between Japan and the Soviet Union. Both countries have expressed interest for some time in joint development of Siberian natural resources, although there have been extended discussions over the specific projects to be promoted. Part of the delay may have stemmed from the fact that Siberian development has become a topic of considerable political debate within the

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[1]Rinjiro Harako, ""Japan-Soviet Relations and Japan's Choice," Pacific Community, IV (October, 1972), 89.

Soviet leadership.[1] The Japanese were cautious both from the standpoint of their investment capital, and because of the fear of becoming tied too closely to the Soviet Union at the expense of their relations with China.

Finally, in January, 1973, Soviet Ambassador to Japan Troyannovsky urged the Japanese to "form a clear-cut judgment" on the Siberian bank loans.[2] Approximately two months later, as has been noted, Prime Minister Tanaka announced that Japan was ready to proceed. The most significant result of the agreement from the Japanese standpoint will be the building of a trans-Siberian oil pipeline which will make Soviet oil available for trans-shipment to Japan. The Russians have encouraged the Japanese to discuss their energy needs, and during talks on oil and gas in November, 1972, made an offer to supply Japan with enriched uranium. The Energy Countermeasures Committee of the Keidanren is scheduled to go to the Soviet Union in April to pursue negotiations on the offer.[3]

<u>Proposals for a Japanese nuclear force</u> The diplomatic face of East Asia has been changing in kaleidoscopic fashion in the past few years. The People's Republic of China has emerged once again into world society, and its leaders in Peking give every indication that they intend to play a serious international political role. China has confirmed, for the time being, the controlled but open hostility between itself and the Soviet Union, and as a counterbalance, has sought to reforge ties with the United States, Japan, and other non-communist states. The Soviet Union, in turn, is finding a

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[1]For a discussion of the domestic Soviet political factors involved see W. Craig Wilde, "Issues in the Development of Siberia and the Far East," The Soviets in Asia, ed. by Norton T. Dodge (Mechanicsville, Md.: The Cremona Foundation, 1972), pp. 29-35.

[2]Mainichi Shimbun, Jan. 27, 1973 in DSJP, Feb. 1, 1973, p. 13.

[3]Yomiuri Shimbun, Jan. 17, 1973 in DSJP, Jan. 18, 1973, p. 28.

greater mutuality of interests with both the United States and Japan. Partly this is in response to the new "reasonableness" displayed in Chinese policies toward the United States and Japan. If they are not to be isolated by the Chinese, the Russians must convince others they are willing to negotiate their differences, and that they have as much if not more to offer than the Chinese. The Russian mood probably goes deeper than merely countering Chinese initiatives, however, for the Soviet leaders seem to be gaining confidence in their ability to achieve their policy goals by negotiating with their adversaries as well as by confronting them. The United States, meanwhile, is in the process of transferring the major burden of keeping the peace in Korea and Vietnam to its proteges in those areas, while at the same time retaining some general presence, as yet undefined in its specifics, in Asia.

These political changes have transpired with little active influence on the part of Japan. Until recently, the Japanese have tended to hesitate where others would often have had them step forward more boldly to assume responsibilities in Asia. It will be increasingly more difficult for Japan to remain only an observer, however, while its neighbors reshape the political landscape. If Japan is to maintain its physical security, ensure its political and economic independence, and enhance its prestige as a sovereign state, Japan will have to marshal its resources and become a positive political actor on the international level. Some people now argue that this security, independence, and prestige can be realized only if Japan has a nuclear force under its own control. These arguments in favor of a nuclear weapons force will now be examined.

National security.--The most obvious application of a nuclear force is military. Advocates justify their support of nuclear weapons not only in terms of the strategic value they would offer in the event of a global confrontation between the superpowers, but also by the tactical options they would afford in a limited confrontation in Asia.

Nakasone Yasuhiro, for instance, believes that tactical nuclear weapons may well be required in future limited conflicts on the Asian continent. The strategic American weapons committed to the defense of the Japanese homeland he finds of little value in such an eventuality. Nor could Japan rely on the United States for tactical nuclear weapons if it at some future date became engaged in a limited war in Asia. Nakasone is also concerned lest China's growing military capabilities, especially nuclear ones, leave Japan simply an object of manipulation in any future military struggle between China and the United States. Even if Washington and Peking should reach a modus vivendi in East Asia, Japan might easily find its freedom of action constricted by mutual agreement of the two nuclear powers.[1]

The Chinese-American nuclear relationship also has a direct bearing on the American "nuclear umbrella," a key element in Japanese defense strategy. Some Japanese military thinkers do exhibit faith in the American nuclear deterrent. Genda Minoru, former Chief of Staff of the Air Self-Defense Force, has urged Japan to rely on the U.S. umbrella and welcome American nuclear weapons into the country. He discounts escalation theories, and predicts that Japan should expect to come under attack directly in the event of a nuclear war. Kaya Okinori, a conservative LDP leader, has called for the retention of American nuclear weapons in Okinawa but not in the home islands. Kaya feels that Japan proper would be spared nuclear devastation as long as such strategic forces were confined to Okinawa.[2]

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[1] Mainichi Shimbun, Oct. 26, 1967 in DSJP, Oct. 27, 1967, pp. 39-41.

[2] Yomiuri Shimbun, Mar. 2, 1968 in DSJP, Mar. 15, 1968, pp. 13-14.

Generally, however, faith in the credibility of the American umbrella has weakened. Wakaizumi Kei, an opponent of a Japanese nuclear force, fears that a rapidly expanded Chinese nuclear force will cause China to be perceived as a direct threat to Japan, and sufficiently weaken trust in the American nuclear umbrella so as to make any defense based on it untenable.[1] Doi Akio, an outspoken proponent of an independent Japanese nuclear weapons force, considers the American nuclear deterrent "unusable" for the most part. His scenario of a future conflict includes a calculated escalation of military pressure, including nuclear forces, on Japan, presumably by China or the Soviet Union. The United States, he feels, would probably delay and seek to forestall a full scale attack on the American homeland rather than retaliate with strategic forces in defense of Japan.[2]

Akagi Munemori, an LDP member and former Defense Agency director who is flatly opposed to any nuclear defense for Japan, argues that while American protection may be useful in a conventional war, "the Japan-U.S. Security Treaty will be of no use in the event of a nuclear war."[3] Utsunomiya Tokuma, a member of the conservative ruling party who has encouraged a Sino-American dialogue as a first step to a cooperative Sino-American-Japanese relationship, does not welcome a nuclear weapons defense arrangement. Rather, he hopes for nuclear disarmament once China is accepted back into the family of nations on equal terms. He does not rule out a Japanese nuclear force entirely, however, "as a logical ultimate consequence" of what he feels is an "unreliable foreign

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[1] Mainichi Shimbun, Sep. 13, 1969 in DSJP, Sep. 25, 1969, p. 32; see also his article entitled "Four National Debates: The Problem for Japan," in Buchan, A World of Nuclear Powers?, op. cit., p. 82.

[2] Yomiuri Shimbun, Feb. 29, 1968 in DSJP, Mar. 13, 1968, pp. 14-17 and Mar. 2, 1968 in DSJP, Mar. 15, 1968, p. 13.

[3] Yomiuri Shimbun, Mar. 2, 1968 in DSJP, Mar. 15, 1968, p. 15.

nuclear umbrella."[1]

The Liberal-Democratic Party has officially taken only a wait-and-see attitude toward the Chinese nuclear force, despite outspoken criticism from its defense-minded elements who tend to discount Chinese military capabilities but feel that Japan should counter them with its own military forces. In December, 1964 the LDP Security Affairs Committee met to consider the political and military ramifications of the first Chinese atomic bomb test. The Committee's report to the party's Executive Board urged cautious optimism. The Chinese force, though psychologically noteworthy, was still barely off the drawing board. The report urged Japan to rely on the Security Treaty for its defense for the time being, and to maintain the momentum of its own rocket, satellite and peaceful atomic energy programs to ensure an overall technological lead over the Chinese.[2] Defense planners, however, do not fail to register their concern as they did in a recent defense white paper, which is a typical example.

> The nuclear military power of Communist China is weak, when compared with the United States and the Soviet Union. However, it can pose a big threat to its surrounding nations which do not have nuclear devices at all.[3]

Public reaction to the Chinese nuclear force has also been restrained. A survey taken in Tokyo in 1963, in anticipation of the first Chinese atomic test, asked whether such a development would endanger Japan's security. Sixty-eight per cent of the respondents felt that it would. When questioned on Japan's response, fully half of this group preferred simply to call on

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[1] Yomiuri Shimbun, Mar. 2, 1968 in DSJP, Mar. 15, 1968, p. 15.

[2] Sankei Shimbun, Dec. 21, 1964 in DSJP, Dec. 23, 1964, p. 3; and Wakaizumi, "Four National Debates: The Problem for Japan," in Buchan, A World of Nuclear Powers?, op. cit., p. 79.

[3] Asahi Shimbun, Sep. 17, 1969 in DSJP, Sep. 20/22, 1969, p. 40.

China to stop its testing program. Less than 5 per cent felt the Security Treaty should be strengthened to allow nuclear weapons into Japan, and less than 1 per cent wanted an independent Japanese nuclear force.[1] Five years later, when Chinese nuclear weapons were very much in evidence, the Mainichi Shimbun asked the question, "China's nuclear development is progressing at a quick tempo. What do you think about this?" Fifty-nine per cent wanted to encourage China to sign the test ban agreement and the Nonproliferation Treaty. Only 13 per cent felt that strengthening Japan's military defenses would be appropriate.[2]

The public debate over Chinese nuclear intentions, and an appropriate Japanese response, is complicated by the diminishing American presence in Japan. To a large extent the Japanese themselves desire a less obvious American profile. Partly this is because American forces on Japanese territory are seen as unnecessarily provocative, and partly it is a manifestation of growing Japanese national consciousness which views such military bastions as the last remnant of a post-war era which should be terminated. Recent opinion surveys show that anywhere from one quarter to over half of the general public want the American role in Japanese defense to diminish to one degree or another. Another 10 to 12 per cent opt regularly for outright abrogation. Twenty per cent or less desire to keep the treaty as it is or to strengthen it.[3] A 1967 survey of political, social and economic leaders

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[1]The survey was conducted by the Public Opinion Science Association in Tokyo and reported in the Tokyo Shimbun, Apr. 3, 1963 in DSJP, Apr. 4, 1963, p. 9.

[2]Mainichi Shimbun, Jan. 1, 1968 in DSJP, Jan. 17, 1968, pp. 11-12.

[3]See Tada Minoru, "Nihon no Anzen Hosho to Kokumin Kanjo," Gunji Kenkyu, (January, 1967), 35, cited in Kim, Major Issues in Japan's Security Policy Debate, op. cit., p. 49; Yomiuri Shimbun, Apr. 22, 1968 in DSJP, Apr. 20/22, 1968, cited in Kim, op. cit., p. 50; Asahi Shimbun, Jan. 5, 1969 in DSJP, Jan. 7, 1969, pp. 22-23 and June 23, 1970 in DSJP, June 23, 1970, p. 28.

conducted by the Yomiuri Shimbun indicated that elite opinion was even more polarized. While 38 per cent in this poll favored retaining the Security Treaty as it existed at that time, over a third called for abrogation.[1]

Part of the public dissatisfaction with present Japanese-American security arrangements may be attributed to lack of a credible American nuclear commitment. A recent survey found only 12 per cent of the public felt that Japan could "sit at ease" because of the American nuclear defense pledge, while 67 per cent felt that it was "dangerous" for Japan to be under such an arrangement.[2] In another poll, when asked whether the United States would help Japan in case of a Chinese attack, 34 per cent of the public sampled and 28 per cent of the Diet members sampled said "No." Forty per cent of the public and 60 per cent of the Diet members said "Yes." When the same question was asked in a post-Vietnamese war context, the "No" responses remained nearly constant while faith in American assistance dropped and "Don't Knows" rose.[3] In two other opinion surveys, 51 per cent and 38 per cent of the respondents felt the United States would not defend Japan "in case of an emergency." In both cases, the "No" responses outweighed considerably the "Yes" ones.[4]

The Japanese government still officially relies fully on the American nuclear deterrent. The government's Defense White Paper, approved by the

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[1]Yomiuri Shimbun, Jan. 1, 1968 in DSJP, Jan. 10, 1968, pp. 7-13.

[2]Asahi Shimbun, Jan. 5, 1969 in DSJP, Jan. 7, 1969, p. 22.

[3]Free, International Attitudes in Four Asian Democracies, op. cit., p. A-32. Most Japanese do not feel a Chinese attack is likely. In this same study only 21 per cent of the public and 13 per cent of the Diet members felt there was such a danger. Among the public, 57 per cent, and among the Diet members, 68 per cent saw no danger of a Chinese attack.

[4]Asahi Shimbun, Jan. 5, 1969 in DSJP, Jan. 7, 1969, p. 22; and Yomiuri Shimbun, Oct. 19, 1971 in DSJP, Oct. 20, 1971, p. 17.

Cabinet in October, 1970, made obligatory acknowledgement of this tenet.[1] However, as evidence of the debate taking place within the government, a statement in the Defense Agency draft to the effect that "autonomous defense is the objective and mutual defense arrangements are supplementary" was challenged by the Foreign Ministry and deleted in the final form of the white paper.[2]

Doubts about the credibility of the American "nuclear umbrella," surely held privately for some time, are now openly expressed. When the American nuclear defense of Japan is discounted by leading political "doves," former JDA directors, the press,[3] and a considerable segment of the population at large, it is not difficult to see why nuclear weapons under Japan's own control might be considered a viable military alternative.

Political and economic influence.--Besides its purely military aspects, a nuclear force is sometimes looked upon as insurance for the politico-economic independence and integrity of the Japanese state. There is a distinguishable tide of sentiment to sustain Prime Minister Tanaka's new policy of "resolution and action." It is most easily recognizable in the confidence expressed in Tanaka's resumption of diplomatic ties with Peking, but can also be detected in the talk about new modes of political action to support Japan's international monetary and trade policies. An informal, but nevertheless real, consensus seems to have been reached on the need to formulate those basic policy decisions which will set the course of Japan's

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[1]Asahi Shimbun, Oct. 20, 1970 in DSJP, Oct. 24/26, 1970, pp. 1-2.

[2]Hiroshi Shinohara, "National Defense," Japan Quarterly, XVIII (April-June, 1971), 158.

[3]See, for instance, the comments on the white paper by the Asahi Shimbun, Oct. 20, 1970 in DSJP, Oct. 24/26, 1970, p. 2.

political future.

Japanese leaders have for some time expressed in general terms their disappointment that Japan was not finding a political role commensurate with its economic power. Recently, the Secretary-General of the LDP, Hashimoto Tomisaburo, stated Japan's misgivings most directly. In objecting to the failure of the leading international powers to "put Japan in a position of responsibility from which it can act," Hashimoto specifically called attention to Japan's failure to gain a permanent seat on the United Nations Security Council, its exclusion from the conference which discussed the rehabilitation of Indochina, and its exclusion from monetary negotiations between the United States and Common Market members.[1]

If recent political rhetoric is any reliable guide to the development of global relationships between states in the future, economic and diplomatic weapons will gain in importance relative to machines of war in the struggles between nations. Skolnikoff has suggested that technology related issues will grow in "political and economic saliency" and "will begin to look like the subjects of 'high politics' today, and become central concerns of government nearly comparable to security-related issues."[2] Up-to-date technology, innovative cross linkages encompassing a variety of national, multinational, and transnational actors, and industries that can compete in the world market will serve as instruments of national security policies along with bombs and guns. The political significance of these non-military factors stems from the fact that they account for the accelerating rate at which nations without large military resources are capable of influencing

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[1]Washington Post, Feb. 28, 1973, p. A20.

[2]Skolnikoff, International Imperatives of Technology, op. cit., p. 96.

the course of world affairs.[1] To enjoy economic and political independence in the future a nation will require access to the basic resources of a modern industrial society, atomic energy not the least among them.

While political leaders may turn to less violent means of influencing the behavior of rival states, force will certainly not disappear from international life. The lesson is not lost on nuclear advocates that the world's present advanced state of peaceful atomic energy development is indebted to past investment in weapons technology. As one study concludes, "we can afford to make plowshares only because we have already paid for the forge to fashion nuclear swords."[2] The extra measure of independence that a nation acquires as a result of controlling the source of this indispensable technological "spin-off" is often cited as compelling argument for a national nuclear military program.

Thus far, Japan has been doubly fortunate in being able to forego the heavy burden of nuclear weaponry while drawing on the vast body of research and development which has resulted from it. Whether Japan can succeed in ensuring a continued free inflow of technological know-how while slackening its political ties with the United States, the major source of this flow, is a moot point. The implications of increasingly independent political and economic decisionmaking are not yet clear to Tokyo; hence the strategy of investing heavily in science and technology, and of building up Japan's potential nuclear power.

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[1]Victor Basiuk develops this theme in his article entitled, "The Impact of Technology in the Next Decades," Orbis, XIV (Spring, 1970), pp. 36-39.

[2]David R. Inglis and Carl L. Sandler, "Prospects and Problems: The Nonmilitary Uses of Nuclear Explosives," Bulletin of the Atomic Scientists, XXIII (December, 1967), 49.

Status and prestige.--A third factor which sometimes leads Japanese to find value in an independent nuclear weapons force is the elevating effect it could supposedly have on the status of Japan as an international political actor. In recent years there has been talk of Japan's accepting its responsibility as a "big power" and calls for "a more decisive nuclear policy."[1] Some, but by no means all, feel that this responsibility and decisiveness can come only with a nuclear weapons force.

For some time Japan has been acknowledged as a leading world economic force and recognized as a potential nuclear-weapons state of considerable dimensions. However, Japan's political power, i. e., the influence it has over the setting of goals in the international community, the establishing of priorities among those goals, and the allocation of resources throughout the community of nations, has not been commensurate with the country's economic influence or potential military power. If Japan is not given the opportunity to exercise the political responsibility it seeks, or as Skolnikoff has put it, "(I)f it is not given its due in the international community, the prospect of Japan once again becoming a military power will be enhanced."[2]

Leonard Beaton feels that prestige is the basic appeal of nuclear weapons to non-nuclear-weapon states. To remove the psychological pull of nuclear weapons, he would have the present nuclear-weapon states dissolve the special privileges which accrue to them by virtue of membership in the "nuclear club."[3] Other observers agree. Wolf Mendl, for instance, suggests

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[1]See, for example, Sankei Shimbun, May 15, 1968 in DSJP, May 15/17, 1968, p. 5.

[2]Skolnikoff, International Imperatives of Technology, op. cit., p. 179.

[3]Beaton, Must the Bomb Spread?, op. cit., pp. 122-27.

that by pressing so persistently for non-nuclear-weapon states to sign the NPT, the nuclear-weapon states may convince them that having a nuclear force truly confers a special status, and thereby make nonproliferation even more difficult to attain.[1] Joseph Coffey has written that "political and psychological persuasions" may be the key to keeping Japan from exercising this military option.[2]

Among Japanese nuclear weapons enthusiasts, Doi Akio feels his country's diplomacy will be strengthened by an independent nuclear force, especially vis a vis other Asian nations. Some strategists, as Wakaizumi notes, fear Japan cannot be truly equal without one.[3] One line of argument is a variation on a persistent Japanese theme that Japan has a uniquely central role to fill between East and West. Japan, it is sometimes suggested, is at the fulcrum of the strategic balance and should add its military strength to that of the West. This theme is echoed in the 1970 JDA White Paper. Without Japanese defense power on the side of the West, it is argued, the military balance will tip in favor of the East.[4] It seems doubtful, however, that the existence of a Japanese nuclear force would, in fact, have much effect on the global strategic balance of forces, since both the United States and the Soviet Union already have sufficient weapons to destroy each other several times over. This is not to say that a Japanese

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[1] Wolf Mendl, "The Spread of Nuclear Weapons: Lessons from the Past," in Preventing the Spread of Nuclear Weapons, ed. by Barnaby, op. cit., pp. 175-78.

[2] Joseph I. Coffey, "Threat, Reassurance, and Nuclear Proliferation," in Nuclear Proliferation: Prospects for Control, ed. by Boskey and Willrich, op. cit., p. 128.

[3] Wakaizumi, "Four National Debates: The Problem for Japan," in A World of Nuclear Powers?, ed. by Buchan, op. cit., p. 81.

[4] Asahi Shimbun, Sep. 17, 1969 in DSJP, Sep. 23/24, 1969, p. 9.

nuclear force would have negligible effects on military and political relationships in East Asia, or that it would not disrupt strategic political understandings and psychological assumptions among the major nuclear powers generally.

Convictions that Japan's prestige is diminished by lack of nuclear weapons to back up its diplomacy can be intense, if sometimes irrational, and should not be discounted as a potentially significant influence in policymaking. In one of those rare instances when personal emotions break through the official Japanese pose of understatement, former Agriculture Minister Kuraishi in 1968 publicly decried the lack of military muscle to meet Russian challenges over fishing rights in the Sea of Japan. Kuraishi labeled the Constitution "silly," and proclaimed that "(t)he safety of Japanese fishing operations will not be threatened if Japan possesses about 300,000 troops and some atomic bombs."[1]

The Nuclear Option

The option to initiate a nuclear weapons program exists today in Japan. It should be kept in mind, however, that an option is an alternative which one may choose to take or not. Unless one subscribes to the theory that Japan is being carried inexorably to a nuclear military policy by virtue of its demonstrated talents in the economic sphere and potential influence in the political, other courses of action are open as well. To exercise this option, political decisionmakers would have to change the course of policy that has been followed since 1945. Dramatic shifts in political policies of the scope envisioned here usually come as the result of fairly substantial impacts on the decisionmaking unit, in this case the Prime Minister and his

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[1]"Chronology," Japan Quarterly, XV (July-September, 1968), 406; and Yomiuri Shimbun, Feb. 10, 1968 in DSJP, Feb. 21, 1968, p. 28.

immediate circle of peers. It is always possible that present political perceptions will be forcefully altered by an international crisis of major proportions, leading decisionmakers to reassess national goals and realign priorities and resources. However, assuming there is no domestic revolution, and no change in the international environment which Japanese leaders would perceive as threatening the territorial integrity or economic well-being of the state, there are also strong stabilizing forces within the Japanese political system which will oppose any such fundamental policy changes.

Traditional bureaucratic inertia and vested interests can probably be counted on to help sustain current defense policy. The Foreign Ministry has championed the use of political rather than military methods of influence, and has been alert to caution against actions which might damage Japan's image as a peace-loving nation in the eyes of the world. The Finance Ministry hesitates to open the treasury to capital hungry programs of broad, open-ended dimensions. MITI's commitment is to thriving international trade and growing domestic industry. A nuclear arms program could well impinge upon these and other bureaucratic preserves to an indeterminant degree, and so those individuals with vested interests in the success of on-going programs can be expected to encourage their continued momentum and resist dramatic reallocation of priorities.

The Liberal-Democratic Party has in the past found it to its advantage to avoid meeting the issue of nuclear rearmament head on, and may well continue to do so for some time. Certain factions within the LDP have viewed such a course favorably, but they have been unwilling to press the issue which is highly unpopular with other elements in the party and with the electorate. The LDP is a political coalition embracing groups of considerably divergent ideological orientations. If the party is to continue to serve as a highly successful conduit to political power, it will have to submerge potentially divisive issues like nuclear rearmament. For the time being, at least, the impetus is towards the middle ground and away from controversy.

Recently, support for breaking up the LDP has been voiced in some quarters. In the last election, the socialists made impressive gains, and should their strength continue to grow, the JSP may some day prove a viable coalition partner for the left wing of the LDP. Should the Japan Communist Party, which former LDP Vice President Kawashima once predicted would confront the conservatives in the 1970s, continue to attract voters as it has been doing in recent elections on both the local and national levels, a JCP-JSP alliance might conceivably be realized which could present a strong challenge to the ruling party. In any event, there are visible cracks in the LDP's monopoly of power, and a question as explosive as nuclear rearmament must be handled with care.

The atomic energy establishment in Japan should also be counted among those forces which would seek to dissuade any departure from the present course of purely civilian development. While certain business elements, notably the Defense Production Committee of the Keidanren (Federation of Economic Organizations), are outspokenly plumping for greatly expanding arms production and for Japan's assuming broader defense responsibilities,[1] other groups are less enthusiastic. The electric power industry is counted among the moderates, and the Chairman of the Tokyo Electric Power Company has even served as the head of the Keizai Doyukai (Japan Committee for Economic Development), the leading spokesman of this latter business faction. As long as the atomic power industry continues to provide profitable outlets

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[1]Frank C. Langdon, "The Business Community," in Forecast for Japan: Security in the 1970s, ed. by Morley, op. cit., pp. 112-16, 123-25.

for investment in Japan, and as long as Japanese companies can maintain access to raw material deposits and reactor markets abroad, there will be a strong tendency within the atomic energy industry to support the status quo.[1]

Public opinion in Japan is also solidly against making a commitment on nuclear defense. Opinion surveys are sometimes cited which seem to indicate that the Japanese people have come to support growing military involvement, and even accept the inevitability of nuclear weapons.[2] Survey findings are not always as straightforward as they may appear, however, and can be subject to varying interpretations.

There is no doubt that the respectability of the Self-Defense Forces has increased in recent years, but this does not necessarily imply support

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[1]In the midst of the debate in 1970 over formulating a policy to meet Japan's oil crisis, the Economic Deliberation Council published a report entitled "The Resources Problem in the International Age" which stressed that Japan must become self-reliant and strive for "the positive pursuit of large-scale 'self-development' and harmony with the international society of nations." The Keizai Doyukai, in response, published its own policy paper, "Resources Policy at the Crossroads," pointing out the dangers in the "self-development" line. Rather than encouraging states to compete among themselves for scarce energy resources, the Keizai Doyukai urged the formation of international consortia and an International Resources Control Board in the United Nations to resolve world energy problems on a global basis. See Shuichi Miyoshi, "Japan's Resources Policy At A Turning Point," Japan Quarterly, XVIII (July, September, 1971), 285-87.

[2]Surveys on the Self-Defense Forces are widely published and need not be reviewed in detail here. For a good summary of recent opinion samplings on this issue see Kim, Major Issues in Japan's Security Policy Debate, op. cit., passim. Three recent opinion surveys on the question of nuclear arms provided the following results. In a 1965-1966 poll of Japanese students, 13 per cent felt Japan would begin manufacturing nuclear weapons within five years, 45 per cent within ten years, and 75 per cent within twenty-five years. See Tanaka Yasumasa, "Japanese Attitudes Toward Nuclear Arms," Public Opinion Quarterly, XXXIV (Spring, 1970), 34. Another poll taken in 1968 showed 27 per cent of those sampled felt Japan would "eventually" have to acquire or develop nuclear weapons. See Free, International Attitudes in Four Asian Democracies, op. cit., p. A-33. Finally, a 1969 poll revealed that while only 16 per cent "hoped" Japan would have nuclear weapons in ten years, nearly one-third felt that the country would, in fact, do so. See the Yomiuri Shimbun, Aug. 7, 1969 in DSJP, Aug. 8, 1969, p. 9.

for, or even passive acquiescence in, remilitarization. Much of the support for strengthening the Self-Defense Forces stems from the fact that the people have feared being drawn into military ventures as a result of Japan's overly close association with the United States. As a price for decreasing American participation in Japanese defense, many Japanese seem ready to accept broader responsibilities for the JSDF as inevitable. One should not conclude, however, that this implies support for political influence by the military on policymaking at home, much less for military adventurism abroad. Faith in neutrality and reliance on the United Nations still register strongly in every opinion poll. Moreover, as Kim has pointed out, broad support on the need for a Self-Defense Force does not necessarily imply agreement on its main purpose. There is evidence to suggest that more people appear to perceive the primary function of the Self-Defense Forces as one of disaster relief than as one of national defense.[1]

There is no consensus in Japan today on the desirability of nuclear defense or even on an overall security strategy into which a nuclear option must fit. Recent developments in East Asia have added a number of new elements to the equation. Over the next few years the Japanese government will most likely not make any major revisions of present security policies, but will reserve judgment until the outlines of the East Asian political environment become better defined. Japan's security posture will inevitably

[1]Kim, Major Issues in Japan's Security Policy Debate, op. cit., p. 46. The results of a 1968 survey on this question are reproduced here.

Primary Function of the SDF	Percentage of Respondents
Disaster relief	37
National defense	24
Internal security	19
Aid in people's livelihood	10
Other, Don't Know, No Opinion	10

be shaped by the nature of the political configuration which will emerge throughout the mid- and late-1970s. For the foreseeable future, it will be influenced more by what happens outside of Japan than by the motivations of policymakers in Tokyo. Because Japanese military concerns are now wholly defensive in nature, its defense planners will be occupied with reacting to threats from the outside.

Japanese security policy will be played out on several fronts. For one thing, there will be a continuing build up of conventional military forces. The 1970 Defense White Paper speaks of the need for "defense power of a considerable scale."[1] It has been estimated that the Fourth Defense Plan, when completed in 1976, will make Japan the world's seventh strongest military power.[2] Concomitantly, security for Japan means ensuring continued economic success, and having its voice heeded in world councils. These goals are reflected in the 1970 Defense White Paper.

> It is a responsible duty in collective security for our country to have defense power of considerable scale and contribute to the maintenance of international peace and security. This, we must not forget, will be to heighten our international position within the Free World, to secure respect and trust of international society, and to establish the basis

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[1]Asahi Shimbun, Sep. 17, 1969 in DSJP, Sep. 23/24, 1969, p. 9.

[2]Shinohara, "National Defense," op. cit., p. 156. Shinohara provides a summary of the Fourth Defense Plan goals, the highlights of which are presented here. As of November 30, 1970, the authorized strength of the Self-Defense Forces was 259,058 military personnel. During the Fourth Defense Plan (1972-1976) personnel increases are expected to be small. The greatest emphasis will be on increasing the quantity and quality of equipment, especially naval tonnage, Hawk ground-to-air missiles, talks, helicopters, F-4 fighter aircraft, and Nike missile units. The 1972-1976 defense budget will be in the neighborhood of ¥5.8 billion, or 0.9 per cent of the GNP. Because of Japan's phenomenal economic expansion over the past decade, even though defense expenditures rose four times from 1960 to 1970, defense costs as a percentage of the GNP dropped from 1.0 per cent in 1960 to 0.8 per cent in 1971. Japan's defense budget in 1971 (¥670.9 billion or $1.86 billion), in comparison with other major countries, ranked twelfth in expenditure but only fifty-second as a percentage of GNP.

for our nation's peaceful, economic development.[1]

The importance of economic issues to the Japanese security debate can be emphasized no more strongly than in a recent speech by Edwin Reischauer, who warned that "for the seventies, Japanese economic growth is perhaps the most explosive factor in the whole world situation."[2] For both Japan and for its trading partners, the time has come to reformulate the economic facts and fictions which shape decisionmaking. Japan is now a member of the board, so to speak, and as such, is seeking greater responsibilities in extending developmental aid, in adjusting its domestic market to foreign competition, and in working generally to establish equitable world trade and monetary patterns.

Political questions, too, will have a vital effect on the shape of future Japanese security policy. Japanese policy at this point appears to be pulled in two directions. On the one hand there is a widespread desire to emerge as an international actor in the fullest sense of the term. In response to the opinion survey taken in 1968, 57 per cent of the Japanese public and 85 per cent of Japanese parliamentarians called for a more "vigorous role" for Japan in world affairs.[3] This perception of Japan as a presently weak but potentially influential international actor is especially strong among Japanese political figures. In another question in this same poll, respondents were asked to rate countries on a "power and importance" scale from one to ten. Japanese parliamentarians rated Japan at 3.8, just above India (3.4), far below the United States (9.5) and the Soviet Union

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[1] Asahi Shimbun, Sep. 17, 1969 in DSJP, Sep. 20/22, 1969, p. 43.

[2] Edwin O. Reischauer, "Looking Ahead in Asia," The Japan-America Society of Washington Bulletin, XVIII (January, 1973), 4.

[3] Free, International Attitudes in Four Asian Democracies, op. cit., p. A-9.

(8.3), and considerably below China (6.0) and France (6.0). However, when asked where they expected Japan to rank in twenty to thirty years, these parliamentarians rated Japan at 8.0.[1]

At the same time that Japanese leaders are seeking more extensive international relationships, there is a strong desire for Japan to retain its own initiatives over policymaking and avoid becoming enthralled to any other state. When asked whether they felt Japan should seek closer relations with its larger neighbors, Japanese parliamentarians answered "Yes" for China (84%), the Soviet Union (89%), and the United States (77%).[2] However, these parliamentarians also felt that each of these countries posed some sort of a threat to Japan: China (39%), the Soviet Union (18%), and the United States (19%).[3] Fifty-eight per cent opted for a policy of neutrality.[4]

Public perceptions of Japan's world role were demonstrated to be along a similar pattern, but were less well formulated and had a considerably larger "Don't Know" element. Forty-seven per cent of the public wanted closer relations with China, 42 per cent with the Soviet Union and 26 per cent with the United States. The public, however, felt that each of the countries "posed some kind of a threat to Japan" of roughly the same magnitude (China 21%, the Soviet Union 21%, and the United States 19%). The public was overwhelmingly in favor of a policy of neutrality for Japan (80%).[5]

What these figures suggest is that Japan is anxious to expand its contacts with the three major powers, but is just as chary of becoming involved in a crusade by any one against another. Because of the great

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[1]Free, International Attitudes in Four Asian Democracies, op. cit., p. A-9.

[2]Ibid., pp. A-14, A-17.

[3]Ibid., p. A-13.

[4]Ibid., p. A-40.

[5]Ibid., pp. A-9, A-13, A-14, A-17, A-18, A-40.

disparity that has existed in the relationships between Japan and the United States on the one hand, and Japan and the Soviet Union and China on the other, Japanese ties with the latter are certain to grow in relative terms at a much faster pace than with the United States. This is unavoidable since slackening the ties that have made Japanese diplomatic and military activity so much an adjunct of American policy is a major part of the new independent stance that Japan is attempting to establish. This need not destroy the cooperative relationship that exists between Japan and the United States, although it surely means that when adjustments in Japanese-American ties are called for, the Japanese will expect that their perceptions of the appropriate policy course will be taken as seriously as American perceptions.

The Japanese-American relationship, whatever its present stresses and strains, has proven itself to be an effective one. Japan has profited materially and has remained physically secure throughout the vicissitudes of the cold and hot wars which have taken place around it in the post-war period. Japan enters into relationships with China and the Soviet Union with no such solid perspective. The Japanese are suspicious that each of its communist neighbors is anxious to enlist it into its own camp in opposition to the other. Attitudes toward the Soviet Union have been consistently negative throughout Japan's recent history. China has been viewed in more favorable terms, but these perceptions have been shaped as much by nostalgia as by the record of recent contacts. Japan has unresolved border disputes with both countries. Trade with China and the Soviet Union has been minimal, and it is too early to tell whether the Chinese and Russian consumer markets will in fact turn out to be as lucrative as is often suggested by some Japanese trade promoters. The potential for a Chinese-Japanese trade war in

Southeast Asia is also rated highly by some people.

As Japan sorts out its changing relationships with its three nuclear neighbors, the prospect of a Japanese nuclear force will always be in the background. Whether or not Japan decides to exercise its nuclear option will depend, in no inconsiderable measure, on the degree to which Japan is successful in meeting its perceived security needs without the benefit of a nuclear weapons force. If Japan is to do so, it will be necessary for the Japanese to speak with an authoritative voice in those international political councils which make the decisions that affect Japan's economic well-being, national security, and overall status as a member of the international community. A permanent seat on the Security Council, inclusion in international monetary negotiations, and consultation with other interested parties on the state of post-Vietnam Indochina have been suggested as ways for the world powers to indicate they regard Japan seriously. Likewise, Japan will expect to have its influence felt in international security discussions involving nonproliferation and strategic arms limitations.

The Japanese atomic reactor program constitutes one major yardstick by which Japan's success can be measured. The technological imperatives of the Japanese reactor program will not always coincide neatly with those circumstances which would be ideal for securing international stability and nuclear nonproliferation. "Innocent progress" toward the bomb will have to be accepted as a consequence of sophisticated atomic energy research and development. Japan would most likely support internationalization of those aspects of the nuclear fuel cycle with critical military significance, so long as influence in such international control councils is alloted on a basis commensurate with the level of peaceful atomic technology in each country concerned. Above all, Japan will insist that its access to all aspects of civilian atomic power development be assured. If the Japanese perceive that their atomic energy programs are subject to being used for technological blackmail, their recourse is obvious.

In the broadest sense, Japan will find security without turning to nuclear weapons only if its leaders are accorded the prestige and exert the influence on world affairs that they regard as commensurate with Japan's status as a major international actor. Japan is, in Scheinman's words, at a "tenuous pause."[1] Its search for a form of national security that does not entail the forever deepening liability imposed by nuclear weapons will be hazardous and may fail, but Japan's neighbors will be helping themselves as much as anyone else if they assist it to that end.

Reactors, Bombs, and International Politics

Because of the relative scarcity of nuclear fuel resources, the expensive and technologically sophisticated facilities involved, and the highly technical body of knowledge required to sustain an advanced research and development program, few countries today could maintain their present rates of technological advance by relying solely on national resources. The various national atomic energy programs have come necessarily to depend on a highly interrelated global system of resource exchange. From the standpoint of resource allocation, then, Japan's atomic energy program exposes the political decisionmaking process to considerable inputs generated outside the Japanese polity by both governmental and non-governmental actors.

The impact of atomic energy technology on the Japanese political system is also evident in the extended debate over the questions of national security and nuclear proliferation. By creating an entirely new range of

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[1]Scheinman, "Nuclear Safeguards, the Peaceful Atom and the IAEA," op. cit., p. 8.

policy options in the area of national defense, atomic technology opened the political system to strong and persistent demands to formulate a group of policy goals to deal with these new policy options. These demands have not yet been met, partly because the search for security on the national level is so much a function of the degree of stability of inter-state relationships on the international level. The NPT reflects the superpowers' attempt to strengthen the strategic stalemate by restricting the number of actors capable of upsetting the global equilibrium. Japan has not been enthusiastic in its recognition of the NPT as an effective political instrument because the treaty did not, at the same time, give the same priority to nuclear disarmament which Japan felt to be the overriding international political goal. Nor did the NPT secure, to Japan's entire satisfaction, its rights to free and unfettered development of the peaceful applications of atomic energy.

The effect of the highly successful Japanese atomic energy development program has been to make vital domestic political questions increasingly open to penetration from extra-societal inputs. As the need increases for making political decisions on societal goals, priorities and resources in Japan responsive to the inflow of supports and demands arising from the interaction of political actors outside of Japan, the Japanese decisional process will become more complex and less subject to control from within the society. Not only can the number of inputs into the decisional flow be expected to increase, but these extra-societal inputs can be expected to be frequently of an unanticipated or even crisis nature. Japanese decisionmakers will have to function in an environment where they have reduced control over the interactions which prompt political demands, and where they have decreased opportunity to plan rationally for future demands of a similar nature or from the same source.

What makes this phenomenon, which is common to all technologically advanced countries, of special interest in the Japanese case, is that Japan is experiencing the full impact of these extra-societal inputs at the same time that the nation is attempting to formulate a coherent role for itself as a major international actor. Whether Japanese attitudes, on balance, will be to accept this increasing penetration by extra-societal stimuli into the national political system as a political fact of life, or will be to attempt to minimize such disturbances by reducing the linkages which lead to these inputs, remains to be seen. Most likely there will be some measure of both.

It seems reasonable to assume that political decisionmakers would desire to reduce most the incidence of political demands not amenable to their own control in those issue-areas which are perceived as most vital to the national polity. In a modern technological society, there are hardly any issues of more critical political concern than those of national security and national energy supply. The preservation of the state as a geographic entity and a rising standard of material well-being go to the heart of national political decisionmaking. The nuclear proliferation issue touches directly on both of these vital national interests. Moreover, as a subject of political decisionmaking, it is one not readily manipulable by Japanese political leaders. Thus, if one is to seek for clues as to the path Japan will choose as it reenters the mainstream of international politics, they should be sought as much in Washington, Peking, and Moscow as in Tokyo.

CHAPTER X

ATOMIC ENERGY AS A POLITICAL ISSUE-AREA: AN OVERVIEW

The foregoing chapters have analyzed the impact of atomic energy technology on the Japanese political system in terms of the opportunity for a widened scope of governmental activity which such technology affords and the articulation of new demands to which this increase in activity gives rise. Indeed, one could argue that the opportunities presented by technological discovery and the resultant societal demands in fact make governmental activity mandatory. The need for an active governmental role in technological development can have far-reaching consequences for the national polity.

One consequence, as illustrated in this study, can be the blurring of traditional distinctions between political and economic spheres. Because of the establishment of formal public economic goals and the commitment of public resources to particular economic programs, economic goals become _ipso facto_ political goals. In the case of atomic energy, which has such vital national security implications, this tendency is quite evident.

Another consequence of this need for government participation in technological programs can be to set at cross purposes the government's role as program advocate and its role as arbiter of the public interest. The tension between the regulatory function and the advocacy function of government with respect to national atomic energy development programs has arisen in Japan as elsewhere. To what extent a government can simultaneously perform both functions adequately is still open to debate.

The need for government involvement in technological development also raises the question of public funding for ongoing scientific research programs. To the extent that the goals of specific technological projects become political goals and public funds are committed to these projects, governments can become preoccupied with developmental and applied research at the expense of basic scientific research. The Japanese scientific community has debated the issue of the relative merits of, and governmental responsibility for, basic, applied, and developmental research in atomic energy since the 1950s. Such problems admit no simple solution. This chapter will provide a recapitulation of the Japanese experience in this regard and some of the approaches that have been taken to deal with these wide-ranging issues. First, however, it might be appropriate to review the conceptual model outlined at the outset of this study and comment on its utility to the material presented in the foregoing chapters.

Conceptual framework reviewed The decisionmaking process flow chart which has provided an organizing framework for this study is a generalized construct which is intended to provide in graphic form an illustration of the process of decisionmaking as it has been perceived here. A general schema of this sort has both strengths and weaknesses.

The framework utilized here was valuable because it suggested certain basic lines of inquiry and helped the researcher focus on the kind of questions that needed to be asked. Basically, the framework presumed that the political function, *i. e.*, the formulation of societal goals, ordering of societal priorities, and allocation of societal resources, is performed within a system. The motive force of the system rests with a set of variables which interact with each other in more or less regular patterns of interaction. The task of the analyst, first, was to identify the relevant variables, the interactions taking place, and the consequences these interactions had for the functioning political system. Then, it was necessary to make inferences as to the probable causes and possible effects of any one discrete event, and to turn to specific lines of investigation in order to confirm or refute the inferences that were made.

Another assumption of the analytical framework provided here was that of rationality. Decisions were assumed to be made in terms of reality as perceived by the decisionmaker; that is, decisions were assumed to be made in terms of more or less specific conceptualizations of the desired end result and with the expectation that a given act will help to bring about that end. Rational decisionmaking does not imply omniscient decisionmaking, however. Rationality is circumscribed both by the limitations of the human mind in accounting for the entire scope of variables which could possible affect the outcome of any act, and by the inconsistency which may arise between the decisionmaker's perception of reality and the objective facts of the situation. However, to the extent that it is possible to identify those factors which will have an impact on the outcome of any particular decision, the decisionmaker will seek to shape those factors to his own ends.

While it is impossible to calculate the totality of factors that will affect the implementation of a political decision in any particular set of circumstances, there are certain broad categories of variables which would seem to merit consideration in any systematic analysis of technological policymaking. One set of variables that is of basic concern includes the formal political structure of the society. Within the regularized set of rule making units and the interactions among them, many of the major political actors, points of access to decisionmakers, and sets of societal goals and priorities which have acquired political legitimacy can be identified. To the extent that these formal sets of political goals and priorities reflect (or do not reflect) those extant throughout the larger society, inferences can be drawn as to the probable effects of decisions taken on the basis of such goals and priorities. The failure of Japanese decisionmakers to anticipate the public concern over siting and safety, for instance, suggests that there has been a less than perfect fit between the priorities established by major political actors and those considered legitimate by the public at large. A certain amount of disruption and readjustment of the decisional process is now taking place to bring the two sets of values more into line with each other.

Informal patterns of interactions within and between politically influential actors can also be significant in explaining decisionmaking patterns. Political actors do not always exert influence upon decisionmaking in exact proportion to their specific policy mandates. For instance, as has been seen in the present study, MITI and the MOF, while having been delegated little direct responsibility for the course of atomic energy research and development, have exerted considerable peripheral and indirect influence within the atomic energy community. The Japanese business community, also, permeates political decisionmaking at all levels in ways not mandated officially.

Another category of variables which could be expected to be relevant for political analysis in questions of technological decisionmaking concerns the impact of technology on the public. This study has dealt with the mass public on a macro level rather than with individual interest groups. Until recently, reactor research and development had stimulated very little political activity on the part of the Japanese public at large. The Gensuikyo (the principal anti-bomb group in Japan) periodically seeks to embarrass the government on its nuclear weapons policy (a topic which is outside the scope of this paper), and groups in the towns near major nuclear facilities publish demands from time to time. Such actions have had minimal political impact. It is the attitude of the mass public as opposed to that of specific interest groups, which is of concern politically. Only in the past few years has the mass public threatened to become a major actor in the politics of atomic energy. Anti-bomb groups, dissident scientists, and isolated groups of citizen protesters have not appeared to have played a significant role in transforming public opinion on the reactor issue. The nature of the technological impact in the move from the research stage to the era of practical application would seem to be the principal determining factor.

Now that atomic power has moved from the theoretical to the practical stage it is beginning to cross more frequently over the threshold of public awareness. As the social impact of the technology has changed, the political ramifications stemming from it have also changed. It was suggested in Chapter I that the impact of technological applications upon a society is directly proportional to the scope of its impact throughout society, how intensely held the attitudes are which are challenged by changing technology, and the span of time through which such changing conditions will be extant. As the scope, intensity and time dimensions of atomic technology have come to be recognized by broad segments of the public with the dramatic entry of atomic power plants on the social scene, the concern by policymakers over public attitudes toward atomic power has also risen.

The wide latitude afforded atomic development in Japan in the past by virtue of public indifference is now more circumscribed. Thus, the public, while it does not always play an active role in policy formulation, is potentially significant depending on the degree to which the public perceives the technology in question to be a relevant social issue. The impact of public opinion has been seen most dramatically in the recent opposition to atomic power plant sitings, in rising concern over radioactive waste disposal in fishing and recreational areas, and in actions taken against pollution industries generally in Japan.

A final area of inquiry which has proved useful in this study is that of extra-societal factors. The intricate web of interrelationships both technological and political, tying the Japanese atomic energy program to international developments generally has been explored at length. It can be debated whether, at the present time, the overall trend of inter-state relationships is toward a greater commonality of interests with a corresponding breakdown in barriers between political units or whether the forces of nationalism are holding fast or even increasing in strength. It can be said with a relative degree of certainty, however, that the impetus of technological development is toward greater interconnecting linkages between countries and, correspondingly, increasing need to tailor national decisions to meet the vagaries of international political considerations. Political, economic and security considerations will not always be amenable to global cooperation in such areas, and the logic of expanding technological and scientific cooperation and interdependence may not be sufficiently persuasive to override other more immediate and visible policy issues. Since international technological developments have maintained greater cooperative momentum than have interstate relationships generally, the potential for stress is ever present and merits attention in any examination of decisionmaking in matters involving the impact of technology on political systems.

Another assumption that guided this analysis was that political acts are shaped by perceptions of the political actors who perform them. Perceptions of reality are at least as important to the dynamics of the political process as is reality objectively determined. The framework introduced in Chapter I relies heavily on this perceptual factor. It has been stressed that the input-output flow is dependent on perception, both in terms of initially setting the goals and priorities which are deemed legitimate societal objectives and because the feedback of ideas, actions and attitudes, which are in response to earlier decisions and which fuel new decisional output in turn, is shaped by individual and group perceptions of reality. Therefore, the task of the analyst who is seeking to explain political behavior or predict likely courses of future action is as much to investigate the perceptions of his political actors as to what is or ought to be (and is not or ought not to be) as it is to search out objective fact.

If one understands the perceptual bias which surrounds policymakers' decisional processes, it is possible to predict with greater confidence the kind of decisions those same policymakers are likely to make. For instance, the conservative political and economic views of those individuals who initiated and subsequently nurtured Japan's atomic complex are strongly reflected in the large and steadily increasing role that private industry has played in Japan's atomic development program. The conviction that Japan ought to support an advanced atomic energy research and development capability, in addition to electric power generation capacity, has had long term effects on the configuration of the resources the country has had to commit to the atomic sector. Given stability of leadership, the course of Japan's atomic energy development program can be predicted with a fair degree of certainty over the next several decades. On the other hand, the major question today concerning the future impact of Japan's nuclear technology stems from the uncertainty as to what the perceptions of the country's present and future leaders are and will be on the military role that atomic energy should play. Thus, an appreciation of the perceptions that decisionmakers have of relevant issues and of the problems they are prepared to face can be extremely valuable in planning reliably for future policy contingencies. For this reason the perceptual factor has been included as a major element of the analytical framework.

One drawback to the input-output model utilized here is that because decisionmaking is approached in macro terms a great variety of discrete acts tend to be subsumed under such rubrics as "input" or "output". To move from an organizing framework of the type set out here to a theoretically self-sufficient model would require such generic terms to be separated out into their component parts. The incrementalist and mixed-scanning schools of decisionmaking have made some progress along these lines by distinguishing the relative influence of incremental decisions from synoptic or fundamental ones in affecting the dynamics of policymaking. Likewise, the distinction of "outputs" and "outcomes" by Easton and others helps to focus attention on the differing significance of such factors for a political system. Political inputs are also discussed in terms of "supports" and "demands" in the literature, but such classifications, while theoretically valid, are still too general to provide solid grounding for operational use.

A related problem, but one which deserves separate mention, is the lack of any mechanism within the basic input-output model for weighting the potential impact of various input factors. The need for some means of distinguishing more important from less important inputs was recognized, and an ad hoc device was introduced into the basic framework to treat this theoretical shortcoming. "Time," "scope" and "intensity" were suggested as a means of conceptualizing the impact of technological innovations within the social milieu. Political impact was perceived in terms of the number of discrete interests and actors affected by a particular decision, the importance of interests affected, and the period of time over which the impact would be felt. These weighting factors could be applied only by inference here, but in moving from the general sort of framework utilized in this study to a more theoretically complete model, a more sophisticated means of quantification would have to be considered.

With these observations on the analytical framework in mind, we now review the major findings of this study.

Recapitulation The administrative framework, which was established to formulate the goals, order the priorities, and allocate the resources for atomic energy development in Japan followed traditional bureaucratic patterns of organization. The principles of statism, collegial leadership, and departmentalism have characterized the atomic energy policymaking process. Statism has meant that the main focus of decisionmaking has been in the central government, and specifically within the Prime Minister's Office. Both the Science and Technology Agency and the Japan Atomic Energy Commission are responsible directly to the Prime Minister. Other agencies, like MITI, the Ministry of Finance and the Economic Planning Agency, which have important planning functions, are also centralized within the Cabinet. The flow of inputs from outside this inner decisionmaking circle is closely regulated. Non-governmental input is generally channeled through the host of existing diverse and overlapping advisory groups. These advisory groups have served two purposes. They have been utilized as a means of soliciting the views of participants vital to the success of various technical projects, as in the case of the Preparatory Council on the Peaceful Uses of Atomic Energy in 1954-1955 and the various government-industry study groups which have continuously reviewed Japan's anticipated future energy needs and drawn up estimates and plans to meet those needs. Advisory groups have sometimes merely provided a facade of participatory decision-making for government policy and acted as filters for potentially disruptive views from outside the official circle of administrative and planning agencies. For instance, Dr. Sakata's resignation from the JAEC Atomic Reactor Safety Investigation Subcommittee in 1959 came as a protest over what he felt was the government's rushing into the Calder-Hall project while ignoring the concerns over public safety raised by scientists commissioned by the government to study just such questions. Likewise, the Science and Technology Council has proved particularly useful in absorbing and diluting criticism from the Japan Science Council.

Collegial leadership has been another traditional principle of administrative practice which has shaped atomic energy policymaking processes. Because political decisionmaking in Japan occurs more as a result of quiet and often unofficial negotiations within a close knit group of decisionmakers than it does from the more highly publicized instances of confrontation between public figures and their critics, access to the decisionmaking collegium is especially important if one is to have any influence on the policymaking process. Thus, since members of the scientific community have no well defined and consistent means of access to the decisionmaking collegium, their influence on political decisions has been much less than that of the business community which provides considerable input for policymaking.

The relationship between the Japanese atomic industry and the government has been extremely close for a variety of reasons. For one thing, there has traditionally been a large degree of overlap between the functions of government and the functions of business in the economic life of Japan. Retired bureaucrats, who generally leave government service at a fairly early age, frequently find second careers in the business world. Also, with the limited government research and development budgets that have been available, private investment has been essential for Japan to keep pace technologically with other industrialized countries. Private investment in the first ten years of the atomic energy development program, for instance, was 20 per cent over the total government investment for this period. Business, in turn, has relied upon the government to provide basic research and training programs, special tax and investments credits, and diplomatic groundwork abroad.

This business-government relationship, though close, has not been maintained without certain tensions. Responsibilities within the atomic research and development program were divided in 1955, with private industry taking on the immediate tasks of importing power reactors and providing economical electrical output as quickly as possible, while the government took charge of long range research and building up of Japan's domestic research and development capabilities. There were two built-in sources of conflict with this sort of arrangement. JAERI, the government's primary atomic research agency, viewed its priorities in terms of long range domestic technological capabilities, and objected to what it felt was an over reliance on imported foreign hardware and know-how and too much attention to short term business profits. The private utility industry, on the other hand, felt that since cheap electrical power had been determined to be the immediate goal, imported foreign equipment and technology was the only possible solution. There was also debate over the distribution of responsibility and the appropriate shares of investment between the public and private sectors. The Finance Ministry was most insistent that the government not invest heavily in the atomic industry without a large share of decisionmaking authority in planning. The utility industries, while they welcomed public funding and research assistance, wished to retain as much independence in funding, staffing and operating as possible.

The debate was controlled but continuous, especially over the relative importance of research versus development. Government scientists in JAERI criticized the JAEC 1957 plan, for instance, because of what they felt was a wasteful FBR research program. They had advised the government that the FBR was beyond Japan's current development capabilities, and it was strongly suspected that one reason for the existence of so generous a FBR budget was political pressure from the utility companies which had already signed FBR development contracts with American reactor firms. The FBR project was soon judged to be premature, and the 1960 plan reflected a larger investment in domestic reactor development projects.

Collegial decisionmaking is not unique to Japan. The desire to reduce open confrontation and to limit the number of actors that have to be dealt with, at least in the early stages of the decisional process, is probably endemic to decisionmakers in most all countries. In Japan, the collegial system is possibly better entrenched than in many other national political systems. The tradition of a strongly hierarchical school system which colors an individual's entire career, the tightly structured promotion schedule by age cohort, the ease of transition from upper government echelons into comparable positions in private business, and the system of political faction leaders who rotate responsibilities all help to perpetuate a collegial mentality among high level Japanese decisionmakers.

Japanese society places a premium on formality in interpersonal relationships and obedience to fixed rules of public behavior among political actors, and in this environment the collegial system has been very useful in processing the business of politics more rapidly than might otherwise be the case. However, collegial decisionmaking could also be applied to other societies to overcome some of the jurisdictional and occupational stratification which so often characterizes complex modern polities.

Individuals in middle and upper level managerial ranks, both within the governmental sector and between government and various private business, educational and social institutions, could be brought together frequently for mutual problem sharing and issue sensitivity sessions. Formal, short term orientation programs or more unstructured colloquia might be useful for focusing on areas of fruitful institutional cooperation or potential conflict. On a longer term basis, career planning for upwardly mobile executives could include periods of employment outside the parent institution in related, but distinct, problem-solving situations. The educational accomplishments necessary for responsible decisionmaking positions, which traditionally have been prerequisites for employment, might be spaced more evenly over the span of an entire career. Academic training might then be both more valuable from the standpoint of the currency of concepts dealt with and more flexible in bringing academic expertise to bear on relevant policy questions. The shared learning experiences from such mid-career training could also provide valuable cross-fertilization of ideas among comparable ranks of bureaucrats, academicians, and industrial and commercial managers.

A third principle of administrative practice which characterized the atomic energy program was departmentalism. However, the lack of interagency contact, which has marked Japanese bureaucracy in general, has been overcome to some extent in the atomic energy area because of the widely diversified nature of technological problems which can be dealt with effectively only with a comprehensive planning and development approach. The Economic Deliberation Council, which prepared the draft for the original Atomic Energy Basic Law in 1955 and which has served as a liaison agency in science and technology matters generally, has helped to overcome some of the built in bureaucratic barriers to communication. However, beyond the top administrative echelons much of the decisionmaking within the various ministerial bureaucracies is carried on in isolation from other agencies, while within the atomic energy community as a whole, government, industry, and university research and development programs continue to function on distinctly separate tracks. The scientific community has often criticized these barriers to a fully integrated national research and development effort, and in 1969 the Diet undertook a study of administrative reform proposals. Little has been accomplished, however, and the administrative and planning process for atomic energy still functions within the administrative guidelines set down in 1955.

It has been noted that the Japanese administrative structure has the potential for deliberating with great speed when the occasion warrants. In 1954-1955, an entire research and development program was put together in a matter of months because there was a broad coincidence of perceptions on the need for a national atomic energy program. Japanese scientists were encouraged by the prospect of resuming their research which had been terminated at the end of the war. The business community was aware of the trade and commercial potential of the atom, and was anxious to realize the economic profits that the development of an atomic industrial sector could bring. Japanese political leaders were convinced that a strong technological base was essential if Japan were to regain her proper share of political and economic influence in the international community. The public generally had very positive perceptions of the potential for peaceful uses of atomic energy. Since there was broad agreement on the overall atomic energy goals in Japan, the general outlines of a research and development program were put together with great speed.

However, the potential for delay and non-decision is also built into the Japanese administrative system, and the structure is well suited to bureaucratic procrastination where there is a lack of political consensus. Suggestions for administrative reform have failed because of the lack of consensus on what, where and how reform should proceed. The Japan Science Council's research reorganization plan was submitted to the government in 1965 and studied for three years by various agencies before the decision was made to leave things much as they had been previously. Likewise, the Science and Technology Council's ambitious science promotion plan in 1960 met much the same fate after being studied to death within the bureaucracy.

The record of atomic energy development in Japan reveals that although the subject of policymaking may be highly technical in nature, the policymaking process is influenced as much by related political, economic, and social factors as by the technical parameters of the subject per se. To the extent that atomic energy planning in Japan can be said to have achieved success in applying technological means to societal needs, this success is largely due to the fact that a rational set of political goals and priorities was outlined in 1955. The overriding goal of atomic energy development in Japan since that time has been the generation of economical electrical power. Another goal, secondary to the first, but one which has extensive technological and political implications in itself, has been the encouragement of a domestic research and development capability. Underlying this has been the determination to achieve a self-sustaining nuclear industry. These twin goals -- securing economical electric power from the atom, and establishing and maintaining a full range domestic research and development program -- joined together by the fundamental tenet of self-sufficiency have shaped the establishment of the technical developments which have been outlined in the major atomic energy plans of 1957, 1960, and 1967.

The Japanese atomic energy development program has been quite successful in achieving the political goals set out in 1955. Japan is in the forefront of atomic reactor technology today. By all current indications, Japan will continue to turn out larger and more efficient reactors, and it is expected to be second only to the United States in electrical output from atomic power plants for the rest of the century. Atomic power plants have now begun to compete successfully with fossil fuel plants, and atomic fuel will go far toward meeting Japan's energy needs for the future. Japan has benefitted enormously from technological know-how and equipment imported from abroad, and is now anticipating a profitable expansion of its atomic industry export trade. These twin goals, economic electrical output and a strong domestic atomic energy capability, have been achieved because the objectives set out in the 1957, 1960, and 1967 plans have been carefully adjusted in the light of changing technical, economic and political factors.

To the extent that atomic energy development planning has failed to anticipate the impact of atomic technology on Japanese society or has failed to resolve certain conflicts that have arisen as a result of technological change, the failure is also largely within the political dimension rather than in the technological. Atomic technology has had impacts on Japanese society in ways that have led to the articulation of political demands which the policymaking process has thus far been unable to deal with satisfactorily. Essentially, these demands focus on the issue of public safety, and on the responsibility of the atomic industry and the government to the public in the event of nuclear incidents which endanger human life or health or damage private property. It has only been recently, with the prospect of having large numbers of atomic reactors located in densely populated areas, that these issues have become highly politicized.

From the standpoint of demography, geography, and geology Japan is poorly suited to the widespread proliferation of atomic power plants. Japanese cities are crowded and the transportation system is under extremely heavy use. Few parts of the country are both suitable for siting atomic power plants and at the same time situated near the populated centers which need the electricity the atomic reactors would generate. Off-shore locations are hazardous because the Japanese diet is so dependent on marine products. The frequent earthquakes that occur throughout Japan also make atomic power plant siting more critical than in many other parts of the world.

It is on the question of safety that atomic technology has had a most direct impact on the general public. The issue was first raised during debate over the importation of British and American commercial reactors in the late 1950s. The export of American atomic technology in any form was closely hedged about by very strict secrecy requirements. Since the paramount goal of the Japanese reactor development program was to achieve economical power generation as rapidly as possible, importation of American reactors was imperative. However, the Japan Science Council complained that an objective determination of the performance of this equipment was impossible because of the strict secrecy regulations. Even prominent scientists in official advisory positions were critical of the government's reluctance to discuss the safety features of imported reactors. Dr. Sakata, chairman of the JSC Committee on Reactor Safety, resigned in 1959 over the failure of the government to consult with qualified members of the scientific community over these problems.

In the British-Japanese fuel import agreement, the "hold harmless" clause, which absolved the British suppliers from any responsibility for an accident occuring after fuel delivery, also raised the public safety question in another form. The Japanese atomic industry had been seeking to restrict its liability in the event of a "nuclear incident" to the extent of its financial capability to obtain insurance protection. The Japanese government, and particularly the Finance Ministry, took a very restrictive view of the government's responsibility to the public in this regard. The compromise reached between the government and the atomic industry provided additional insurance to private operators underwritten by the government. However, the government indemnity was strictly limited, and there was no solution to the question of the government's responsibility in the event of nuclear damage exceeding the insured limits of the private operator. The public has been caught in the middle, and although certain features of the liability question have been clarified, estimates of the potential financial cost of a major reactor disaster still exceed the statutory limitations of indemnification. The safety debate was quite intense within a limited circle of government and scientific figures directly concerned with atomic energy policy. However, the projections for commercial power generation were rather pessimistic in the late 1950s and the issue did not assume a meaningful form to the public at large.

More recently, as the day of large scale atomic power generation has approached, and with the intensified interest in environmental pollution problems generally, the public safety issue has come into prominence once again. Atomic power advocates in the government and in industry are now giving the public safety issue much more attention than they did a decade ago. They have expressed concern that the citizen action movement stimulated by concerns over safety and environmental pollution could well be the most serious domestic challenge to the reactor program yet.

A major difficulty in arriving at a political solution for a problem of this sort is in articulating it in a meaningful way, and then integrating it into the overall set of political goals and priorities from which decisions on technical development are derived. As has already been noted, the public has not had the technical information nor, until recently, sufficient interest in the safety and siting question to articulate political demands in any consistent or coherent fashion. The scientists who have the professional expertise to do so have been singularly ineffective in utilizing their technical knowledge to influence political decisions. Not only do the scientists lack a large, definable constituency for which they can speak, but they have been unable to formulate the safety issue into a compact unit amenable to policy action. While the JSC and other scientist critics have pointed out the problem, they have failed to formulate acceptable options from which decisionmakers could choose a remedial course of action.

There is evidence that the uncharacteristically high degree of public activity over nuclear power plant sitings and environmental problems in general is beginning to have some political impact in Japan. Primarily this has been on the prefectural and local level. Citizen action groups, some independent local movements and others associated with national interest groups like the Japan Fishermen's Association and the Japan Housewives Association, have lobbied for governmental action on such problems and, in certain instances, have reached agreements directly with companies on a case by case basis. Whether this is an isolated phenomenon which will fade away once immediate objectives are achieved or frustration is felt from failure to have a meaningful policy impact, or whether public action units will persist as a new medium for the articulation of political demands remains to be seen.

There is considerable resistance to direct public participation in decisionmaking among political decisionmakers. Generally, the flow of contacts between government and the public has been unidirectional, with information coming from the top down. There has been little reverse flow even though certain government figures have lately welcomed more public participation. Just what the official government perception of this participation may be is not clear. The questionnaire distributed as a part of this study revealed that only social scientists are strongly committed to direct public participation in decisionmaking. Other groups of scientists are much less certain of the value of such participation, while the limited number of decisionmakers surveyed were much more strongly opposed than the scientist groups.

Because the Japanese scientific community is divided in its attitudes toward public participation in the decisionmaking process, the prospects for reaching some common understanding on the implications of technological change, and on the relative merits and demerits of the atomic reactor program specifically, are less bright than they might otherwise be. While Japanese physical scientists focus primarily on the ends to which science policy is directed, social scientists are as much concerned with the processes by which science policy is formulated as with the ends to which it is directed. Therefore, the orientation of the two groups on public participation is different.

This dichotomy of scientific opinion in Japan, and the apparent inability of the scientific community to reach some common ground on the pros and cons of widespread use of atomic technology, has tended to polarize attitudes both in informed technical circles and among the concerned public at large. The unique service which only the scientific community could have performed, i. e., providing a coherent body of data on the risk-benefit tradeoffs facing society, has not been performed. As a result, informed discourse is difficult, and the many political decisions which will be needed to set reasonable performance and safety standards, to allocate societal resources efficiently, and to apply alternative technologies effectively will be made without the full benefit that a dispassionate scientific estimate could provide. Thus, the pressure on policymakers to make the "right" decision will be intensified while the rational basis for their reaching a decision will be reduced.

Participation of Japanese scientists in political decisionmaking has also been shown to be very limited. Generally, the policymaking role of scientists has been simply one of providing technical advice when called upon by the government. Although Japanese scientists appear to welcome political debate over the goals of science, for the majority, the perceptions of such debate is limited and does not extend to the electoral arena. Only social scientists showed any enthusiasm for bringing scientific issues into electoral politics. Moreover, scientists in general conceded the initiative in policymaking to the political decisionmaker. However, there is strong feeling among scientists that when selecting scientific advisors there should be greater attention to the opinions of the scientific community. In brief, this examination of the atomic energy decisionmaking process does not indicate that Japanese scientists have exercised any considerable degree of influence over the formulation of the broad political goals which shape the direction of scientific and technical programs, nor does there appear to be any substantial basis for such influence to be exercised in the future.

The JSC's legal mandate to promote science and ensure that scientific opinion is reflected in policymaking might have provided the scientific community a means for building up its influence in the political arena. However, Japanese scientists have been fractionated and their potential influence diluted. In the atomic energy area, the dispute within the JSC over the long range atomic energy development plan in 1968 and the present involvement of certain atomic scientists in the anti-nuclear reactor siting movement are evidence of the basic lack of agreement among scientists on policy questions. Nor do Japanese scientists or political decisionmakers evidence much ability to perceive policy issues from the perspective of the other. Scientists tend to feel that decisionmakers do not understand scientific questions and ignore the consequences of their political acts to scientific development, while Japanese political figures often dismiss criticism from the scientific community as ill-founded or mere carping.

The impact of atomic technology on the Japanese political system has also been felt in the degree to which extra-societal inputs into the policymaking process have an influence over the formulation of political decisions. Few countries, and certainly not Japan, are technologically self-sufficient to the extent of being able to build and operate a major atomic energy program free from any outside assistance. Japanese uranium fuel was practically non-existent and from the very start Japan has had to rely on uranium supplies located physically beyond its borders. Exchanges of technological information and the importation of equipment were also necessary. Initially, since the United States was the most advanced country in reactor technology and had offered to share its knowledge, and because of close political and economic ties generally between Japan and the United States, American technological know-how and equipment were relied upon to provide the foundations of Japan's atomic energy development program.

The extent to which Japan should be dependent on the United States was a source of considerable debate within Japan. Once the technical decision had been made to generate commercial electrical power output as quickly as possible, the political implication was unavoidable that Japan would have to rely to a considerable degree on the United States. This close association was received with mixed feelings in Japan. Business circles generally welcomed this because of the close economic ties that had already grown up between the two countries and because they stood to profit from the exchange agreement. Scientists had many more reservations because they feared that Japanese science and technology would suffer as a result.

Although priorities differed on the relative emphasis that should be placed on importing American technology and on developing domestic capabilities, there was no disagreement that dependence on foreign sources of fuel and technology should be kept to a minimum. Self-sufficiency has always been a major objective of the Japanese atomic energy development program. One of the principal reasons for developing natural uranium reactors simultaneously with enriched uranium reactors was to reduce Japan's continuing dependence on the United States. Thus, British natural uranium reactors were imported along with American-made enriched uranium models. At the same time, uranium enrichment and plutonium extraction technology have been perfected by the Japanese to lessen the heavy dependence on American fuel which was unavoidable in the early years of the program. Japan has continually expanded its technological exchange programs both in scope and number. Today the Japanese are engaged in a joint uranium enrichment project with the United States, an FBR development program with Britain, fusion research with France, and a variety of other coöperative agreements with most states with significant atomic energy programs. Japan and the Soviet Union are presently discussing joint enriched uranium production, while the People's Republic of China is seeking Japanese technical assistance with its reactor development program.

Japan has been a leading advocate of international solutions to problems associated with atomic energy, and the Japanese energy industry in general fully appreciates the need for Japan to retain strong trade ties and technological exchange agreements with other countries. However, the unwelcome effect of such international linkages has been a certain degree of political penetration which the Japanese have done their best to minimize. Political penetration, Rosenau has suggested, takes place when the members of one polity "share with those in the penetrated polity the authority to allocate its values." Using the definition of politics that has been followed in this study, political penetration occurs when members of one polity share with those in the penetrated polity the authority to set its societal goals, establish its societal priorities and allocate its societal resources.

It has been suggested that the intensity of the debate in 1958 and 1959 over the secrecy provisions in the American atomic technology exchange program and the "hold harmless" clause in the British agreement was due to the political penetration which occured along with the technical arrangements. The American secrecy demands were received by the Japan Science Council as an unwarranted intrusion into Japanese political life. The secrecy requirements imposed by the United States, in the eyes of the JSC, ran directly counter to the JSC principle of free and open discussion of atomic energy data. This principle had been written into the Atomic Energy Basic Law. Likewise, the "hold harmless" clause indirectly raised the whole question of government indemnity for private Japanese industry. Since the "hold harmless" clause made it impossible for a Japanese atomic energy reactor operator to sue a British fuel supplier to collect damages in the event of a nuclear incident involving British-supplied atomic fuel, Japanese reactor operators were insisting that a Japanese government indemnity be provided to backstop the private operator's liability. The question of the respective role of government and private investment in atomic energy development was being debated in Japan at the time, and the Japanese-British fuel agreement completely undercut those who were arguing for a very limited governmental role. If the Japanese operator could not afford adequate private insurance coverage, as the Japanese industry was claiming, and if there was no recourse to the foreign supplier, indemnification for the Japanese public in the face of a major disaster would have to be underwritten by the government.

It was the appearance of political "strings" like these in technological exchange agreements that helped to encourage Japan to develop its own technological capabilities as quickly as possible. Later cooperative arrangements with France and other countries were drawn up with an eye to "perfect mutualism." Japan has been successful in large part in eliminating the undesirable political features of earlier technical agreements because the Japanese atomic industry is increasingly able to meet its own technological needs. Ironically, Japan's successful domestic research and development program, while reducing the incidence of political penetration via imported technology, has opened the door to penetration from another source. Japan, like a number of other non- but near-nuclear-weapon states, has become so sophisticated in its atomic technology that it is technologically within months of building an atomic bomb should the political decision be made to do so. The Nonproliferation Treaty was an attempt led by the United States and the Soviet Union to forestall the spread of nuclear weapons and reinforce their dominant positions in the limited nuclear consortium.

The effect of the NPT, in limiting the policy options available to political decisionmakers in Japan, and by restricting the allocation of national atomic resources, was to institutionalize the penetration into the political processes of the signatory states of extra-societal actors (in this case, those countries that have adhered to the Treaty). The Japanese have been highly reluctant to accept such forms of political penetration. All of the opposition political parties in Japan opposed Japan's signing of the NPT, and the government acquiesced primarily because it felt that, for the moment, Japan had little to lose while it hesitated to risk the political alienation of the United States, the Soviet Union and other signatories which might have followed such a decision on Japan's part. Additionally, by signing the NPT but withholding final ratification, Japan hoped to apply pressure on the United States and the Soviet Union to come to some agreement on nuclear disarmament, the primary objective of the NPT as far as Japan was concerned.

Japanese adherence to the NPT is conditional at this point. While inspection of Japan's peaceful atomic energy facilities appears to be working satisfactorily at this point, and while Japan has continued to share fully in the latest technological advances in the field, Japan's final decision on whether or not to ratify the Treaty will depend to a large extent on the nature of the relationships that develop between the United States, the Soviet Union, and China in the next two years. If Japan is to continue within the NPT framework it is likely the government will have to ratify the Treaty before the 1975 review meeting in Geneva. Therefore, in terms of the NPT, Japan's perceptions of the relationships that are developing between its three nuclear-armed neighbors, and its perceptions of the intentions of each of these states toward Japan, are crucial.

American-Japanese relations are critical to future Japanese nuclear policy. Without the continuance of a strategic nuclear guarantee, Japanese defense strategists have already indicated Japan would have to acquire nuclear defensive weapons. The Security Treaty, which has been the basis of the post-war alliance between the two countries, is undergoing reinterpretations as a result of the rapprochement of both partners with China. There is reason to believe that the Chinese will tolerate, and perhaps even welcome, a continued American nuclear guarantee to Japan. Just what the Chinese-American understanding is on the Japanese-American partnership, or perhaps more importantly, what the Japanese perception of that Chinese-American understanding is, will go far in determining whether or not Japan feels an independent nuclear force is necessary. If the Japanese perceive that the Chinese-American rapprochement has substantially reduced the credibility of the American nuclear guarantee to Japan _vis a vis_ China, the major plank of Japan's post-war strategic defense policy will have been removed and a restructured defense policy will be inevitable.

Any decision on Japan's part to acquire a nuclear defense force would be predicated on the perception that a potential adversary in fact exists. To the extent that the political and economic ties now being forged between Japan and its two nuclear-armed neighbors on the Asian continent are successful in creating a broadening base of mutually profitable technological and economic exchanges, the perceived need for a Japanese nuclear force should diminish. On the very vital question of energy supply, both the Soviet Union and China have indicated they are willing to help Japan meet its need for oil and enriched uranium. In return, China seeks Japanese technological assistance and the Soviet Union seeks Japanese investment capital in Siberia.

Japan's strategy, for the time being, will probably be to retain its nuclear option and to continue to improve its overall level of technological competence. The peaceful atomic energy program will remain a vital part of this technological base, and it will have great strategic importance in two respects. First, Japanese economic viability will become increasingly dependent on the performance of the atomic reactor program. By 2000 current estimates are that fully half of Japan's electricity will be generated by atomic energy. Any threat to Japan's atomic energy supply will be interpreted as a threat to existence of the state itself. Also, by maintaining a highly sophisticated level of peaceful atomic technology, the time lag that would ensue between a political decision to "go nuclear" (if and when such a decision were made) and the physical existence of a complement of nuclear armaments will be kept to a mimimum.

In the meantime, Japan will expect to be included as an equal partner with the other major international actors in shaping those decisions which will determine the political future of the international community of nations for the remainder of this century. Japan has indicated that it is willing to play its role for the time being without the added nuclear weight which has come to be widely regarded as a measure of political actors of the first order. Whether Japan is to be successful in this attempt will depend on whether the struggle by the United States, China and the Soviet Union to exert influence over the course of international political and economic developments can be confined to non-military forms of competition. Force will not be eliminated from the national arsenals of power, and Japan is certain to utilize its potential military strength, both in its conventional and nuclear dimensions, for diplomatic leverage. However, if Japan's political leaders come to feel that Japan is able to exert its influence in the international community to a degree that is reasonably commensurate with the expectations that they have come to regard as legitimate, the need for a decision on the nuclear option may be postponed indefinitely.

It is obvious that Japan's nuclear technology is far and away the most advanced of that in any country in the Far East. How this technological sophistication will translate into political terms for the remainder of the 1970s is not so clear. Thus far, in spite of Japan's rapid nuclear development, its leaders have not as yet turned this technological prowess to much diplomatic advantage. Should they attempt to do so, there is no doubt that Japan's technological and economic weight would lend considerable authority to their demands.

However, Japan's leaders will surely apply such pressure cautiously and sparingly, especially in any political confrontation with other major international actors. They have frequently pointed out that Japan's economic success rests on a precariously narrow base. Japan will continue to depend on imports in all major economic sectors, including energy, food and all the "necessary" consumer goods which the public has come to demand. The country has much less cushion within its domestic economic sector for absorbing economic disturbances than does the United States, the Soviet Union or even the European Community. Since Japan is so dependent on stable international trading relationships, its long term interests lie in separating economic and technological issues as much as possible from the ebb and flow of political discourse. Thus, any attempt to bargain Japan's economic and technological influence for political advantage will entail no inconsiderable risk to Japan itself, and will have to be accompanied by a much stronger set of political objectives than has been evident in recent years.

From the standpoint strictly of its nuclear capability, Japan has the potential for damaging the fragile structure that the United States and the Soviet Union have sponsored for controlling nuclear explosive devices. Both countries appear to set great store by the nuclear Nonproliferation Treaty, for instance. They evidently feel that their common interest lies in lessening the chances for a nuclear miscalculation between themselves and their allies, and for over five years they have been urging Japan first to sign and now to ratify it. Japan could deal a severe blow to this design by refusing to follow through on the NPT, but, again, at no small risk to itself. The consequences of any decision by Japan to develop nuclear weapons have been treated at length in this study and need not be repeated here.

Japan also has the capability for developing peaceful nuclear explosive devices, and has pointedly refused to renounce its sovereign right to make use of this technology should a suitable occasion present itself. As the search for new fossil fuel resources around the world intensifies, and as countries seek quick inexpensive methods for constructing large scale projects like canals and ports, it is likely that peaceful nuclear explosions will be looked upon with favor in many quarters. The United States and the Soviet Union have discouraged the development of such nuclear technology by non-nuclear-weapon states, both in the Limited Test Ban Treaty and in the Nonproliferation Treaty, because it is impossible to make a technical distinction between such explosive devices and nuclear weapons and because such explosions can result in radioactive contamination across international boundaries.

Japan has the technological capability for upsetting the existing moratorium on peaceful nuclear explosions. However, as in the case of nuclear weapons, any decision to exercise this technological option would certainly have broad political repercussions. So long as peaceful explosions cannot be distinguished from military related ones, the United States and the Soviet Union will most likely discourage the use of nuclear technology for such purposes. Here again, Japan's nuclear technology could provide it with a certain leverage in dealing with the superpowers.

On the other hand, Japan's nuclear technology could also be the source of some frustration for its political leaders. From the standpoint of the domestic scene, any nuclear question will be treated with a high degree of circumspection by the opposition and probably by a significant segment of the public as well. Even purely civilian aspects of nuclear technology will be handled carefully. Certainly, any suggestion that military uses were being considered -- even for purely defensive purposes -- would cause considerable political clamor within Japan. Advocates of civilian atomic power development can be expected to be especially chary of any new policy openings which would in any way make their own dealings with the public over siting and nuclear safety issues more difficult.

Energy policy is perhaps the area in which Japan's nuclear technology has the best chance of making a positive diplomatic impact. The global need for fissionable nuclear fuel, including enriched uranium, will become more acute by the early 1980s. Recently both the United States and the Soviet Union have indicated their interest in setting up joint enrichment programs with Japan. All three parties also have a common interest in cooperating to develop other potential energy sources. Japan not only has highly advanced energy technology to offer to such partnerships, but Japanese capital is also being sought after to help meet the very high costs of research and development. Japan is already the world's major importer of oil, and it will soon be second only to the United States in the consumption of electric power from atomic reactors. In a world where fuel margins for energy production will become increasingly more critical over the next decade, Japanese fuel consumption, production and investment policies will be viewed with great interest in other major energy consuming countries.

The extent to which Japan's technological capability in nuclear energy will influence its relationships with other major international actors remains to be seen. In large part, it will depend on what sort of issues arise with respect to the utilization and distribution of nuclear techniques. Taking a broad view over the next decade and beyond, a strong argument could be made that Japan's decisions on nuclear policy will be crucial for the shape of interstate relations for the rest of the century. However, much of international diplomacy is essentially ad hoc in nature with only secondary attention to the long range effects of decisions which must be made to deal with immediate, critical issues of the moment. In such a situation possession counts for more than potential. It will be a real test of the skill of Japan's diplomats and of the foresight of the world's leaders to see if Japan will be able to deal effectively when it is missing the major trumps from its hand.

Concluding remarks Several major themes have run throughout this particular case study of the interface between science, technology and public policy-making. These themes are set out below as propositions which, from the perspective of the atomic energy program in Japan, would appear to have general application in similar instances of technological change.

The first conclusion is that decisionmakers tend to use traditional political institutions to deal with the social, political and economic issues that arise as a consequence of changing technology. Even though innovative structures and procedures may be called for, policymakers will turn to existing institutions (or create others in their same image) to meet new demands. Thus, while the technological stimulus may be revolutionary in its social implications, political responses to these stimuli will tend to be formulated within the existing institutional framework. Since political change tends to come about in reaction to, rather than in anticipation of or simultaneously with, changes elsewhere in the social and economic spheres, a surplus of political demands build up resulting in a certain amount of stress in the political system. In short, the degree of political stress and the rate of technological change are related to each other directly and proportionately.

The second conclusion of this study is that making political decisions on technological issues need not be predicated on a particularly sophisticated understanding of the technological aspects involved. The fundamental decisions which have determined the course of Japanese nuclear policy have been made largely by political and business leaders while scientists have had a generally limited impact on the political process. Clearly, with the government's atomic bureaucracy responsible directly to the Prime Minister's Office, and with the wide influence that MITI and the MOF have exercised on the policymaking process, technological factors of the nuclear policy equation have been adjusted within the larger political and economic setting. While technology has broadened the scope of decision-making it has not dictated the nature of the decisions to be made. The real effect of the scientists and technologists has not been to override traditional centers of political decisionmaking but rather, by effecting the rate of social change, to create more political demands and, in turn, to make political decisionmaking of more critical importance than before.

Third, the most pressing political need today is to incorporate effective long range planning mechanisms into the ongoing political system. If societies are to exploit the full measure that modern technology can give them, the allocative authority of governments must be rationalized in advance. Political actors must begin now to anticipate changing societal needs and priorities, and set goals accordingly in advance.

Collegial decisionmaking is one mechanism which appears to have worked quite well for long range planning in the Japanese nuclear program. In those areas where there has been the fullest and freest interchange of information and sharing of responsibilities, i. e., in the government-business partnership in research, development, and promotion, the successes have been the most spectacular. The "refundment upon success" method, by which government financial backstopping of private investment is available for capital intensive but high risk projects, would seem to be widely applicable in other settings.

On the other hand, in policy areas where the planning record has been less far-sighted, like siting, public safety and regulation, there has been a notable lack of communication between the business-government advocates on the one side and the public and scientific critics on the other. While it seems unlikely that all the complex questions which have arisen lately could have been solved by greater participation of these groups in earlier stages of the decisional process, the evidence suggests that some problems could have been anticipated and worked out with less disruption to the nuclear industry than is now occurring.

Japanese planners have also benefitted from the experience of more technologically advanced countries and avoided some of the more costly mistakes. Japan's experience in this regard underscores the need for international cooperation in complex technological research and development programs. For those countries at the technological forefront unable to draw on the prior experience of others, alternative scenarios can be programmed for modern computerized projections which should at least clarify some of the specific issues which will have to be resolved. Some people are confident that computers can eventually do much more than this.

Coordinated social planning need not imply a monolithic executing bureaucracy, however. The very complexity of modern technological societies makes it impossible to pull together all threads into one center. Japanese planners have now recognized the value of regional decisionmaking centers which facilitate coordination among local governments and public interest groups. Public hearings are also to be made a part of the Japanese institutional framework for siting atomic energy facilities. Such mechanisms can be quite valuable or merely pro forma, depending on the sincerity of those responsible for them. The adversary technique, which pits expert against expert and allows for cross-examination of witnesses, has been suggested as one means of improving their utility. With today's highly sophisticated communications technology, it should be possible for many individuals to exchange views regularly with each other via closed circuit television and centrally located information banks. Vast amounts of research and development data could be accumulated from a great variety of sources and stored in central repositories for use by all interested parties, with due respect for the proprietary rights of the contributors. By such means as these, it should be possible to decentralize the allocation and distribution of societal resources even while bringing a more effective planning structure into being.

Finally, because societies are coming to recognize that the physical security of the state and the economic well being of its people are inextricably linked to the level of scientific and technological research and development, science and technology are coming to be perceived increasingly as questions of "high politics." Science and technology will continue to move more toward center stage in international politics, and technically oriented agencies within government will find themselves increasingly absorbed in foreign policy issue-areas. The scope of international diplomacy will expand as a result of this added dimension, and because of the vast investment and immense store of know-how required to sustain an advanced international reputation in science and technology, those countries which have already achieved leadership in these areas are likely to remain as the major international actors, while the less developed countries are likely to continue to play a minor role. While these new technological aspects of interstate relations may well bring with them increased competition between nations, this competition can be manifested either in the spirit of cooperation or of conflict. Which spirit on balance will prevail is at heart a political question.

This study has been an examination of the political consequences that follow the input of a complex series of technological changes into a modern industrialized society. The basic effect of an increasing tempo of technological change is to increase the importance of the government to society. The political challenge presented by a rapid expansion of the boundaries of scientific and technical knowledge in modern societies is twofold. On the one hand science and technology, by providing the "tools for the achievement of social, political, or economic ends,"[1] provides the opportunity for a greatly expanded scope of governmental activity. Snow has spoken of the power of science to provide in greater abundance those "primal things" of human existence like "years of life, freedom from hunger, and survival for children."[2] Increasingly, men everywhere are now coming to expect an ever larger share in life's primal things, and they are coming to realize that it is in the power of science and technology to provide them. Governments

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[1]Harvey Brooks, The Government of Science (Cambridge: M.I.T. Press, 1968), p. 10.

[2]C. P. Snow, The Two Cultures: and A Second Look (Cambridge: Cambridge University Press, 1964), pp. 79-80.

will become better able to meet these rising political demands because they can set new goals and make use of new resources offered by technology.

The political challenge of expanding science and technology is also manifest in the need for governments to order their new goals and allocate their new resources through a political process. As scientific and technological development reaches the stage of practical application, it stimulates a continual and growing source of political demands which must be formulated into specific goals. These goals, in turn, must be ordered into a set of priorities, and the resources necessary to the realization of these goals must be allocated in a rational manner.

Technology, by providing new goals for society to strive for and by stimulating new demands for ordering and allocating new societal resources, induces reactions in the political system. What the extent of these reactions will be and what the effect these political changes have on various groups within society is not within the grasp of technology to say. Debate over the proper uses of technology will continue to be framed in political terms, and the effects that technology will have on the social order will stem as much from the political choices that are made as from the technical options that are available. The technical aspects of the decisions to be made are no guarantee that these political choices will be more rational than they might otherwise be. For decisionmaking to be effective, what is necessary is that the technological and political facets of policy alternatives be distinguished, not for the purpose of isolating the one from the other, but so that technology can be made to serve more clearly those political goals which the society has chosen.

APPENDICES

APPENDIX I

Name and Address
of respondent

Dear

I am asking for your assistance in a study I am engaged in of the Japanese atomic energy program. The objective of my study is to determine how policies for atomic energy development are formulated, especially with reference to the involvement of Japanese scientists and political decision-makers in the policymaking process. As part of my research I am contacting responsible Japanese scientists and political decisionmakers like yourself to help determine the perspectives of these groups on atomic energy issues.

The attached questionnaire will be used as supporting data for my doctoral dissertation which I am preparing at George Washington University through the Program of Policy Studies in Science and Technology. My research has been supported by a grant from Mr. James E. Webb, formerly director of the National Aeronautics and Space Administration (NASA). All responses to the questionnaire will be used only to compile group statistical data, and all answers will be strictly anonymous. I am requesting that you provide merely the most general occupational information so that I may accurately code your responses in categorical groupings.

Scholarly studies of Japanese society and the Japanese political system are becoming more frequent in the United States today. However, they are meagre compared to the attention that American society and politics have been given by Japanese scholars. This is especially true in the scientific and technical fields. I feel the Japanese experience in public policymaking in scientific and technical fields can be of value to decisionmakers in advanced countries like the United States as well as in many developing nations which hope to benefit from Japan's impressive economic and technical achievements.

The questionnaire should take less than thirty minutes of your valuable time. It will have great significance for my research. For your convenience, I am enclosing a stamped, self-addressed return envelope. I would welcome any additional comments you may have on this questionnaire or other aspects of my study.

Thank you for your assistance.

Sincerely,

Rodney L. Huff

APPENDIX II

THE
GEORGE
WASHINGTON
UNIVERSITY

Washington, D.C. 20006 / Program of Policy Studies in Science and Technology / 202-676-7380

前略

私は、ワシントン市、ジョージ・ワシントン大学の大学院生で、日本の原子力問題に関する研究をしておりますが、このたび、ぜひとも貴殿にご助力をいただきたく、突然のお願いをする次第です。私の研究の目的は、日本における原子力開発政策がいかにして策定されるかを調査することで、とくに、その政策決定過程における科学者および政府・政界首脳部の役割に関する研究を課題としております。このような事情で貴殿をはじめ、日本の責任的地位にある科学者、政府・政界首脳部に原子力問題についてのご意見を伺いたいと存じます。

同封のアンケートは、私がジョージ・ワシント大学で科学、技術政策の研究に関する博士論文を作成するための補助資料として使用するものであり、この研究は、アメリカ航空宇宙局（NASA）のジェムス・エー・ウェブ氏の補助金で援助されているものであります。アンケートに対するすべての回答は集団的統計資料として編集され、完全に匿名であつかわれます。その際、貴殿のご回答を正確に職業別グループで集計できますよう、大まかにご職業の内容をお教え下さるようお願いいたします。

最近、アメリカにおける日本の社会と政治制度に関する学問的研究は、ますますさかんになってきておりますが、それは、アメリカの社会と政治に対する日本での関心に比較すると、なお貧弱であり、とくに、科学、技術の分野での政策決定に関して日本の示した手本は、日本の輝かしい経済、技術上の業績から学ぼうとしている発展途上の国々と同様、アメリカのような先進国と称される国にとっても貴重なものと思われます。

このアンケートは、貴殿の貴重なお時間の30分もかからずに御記入いただけると思いますが、私の研究にとりましてはきわめて重要なものであります。このアンケート又は、私の研究内容に関し、さらに追加してご意見をうかがえますならば誠に幸いに存じます。

なお、返信用封筒を同封いたしました。ご多忙中、貴殿の貴重なお時間をおさき頂き、心から感謝いたしております。何卒よろしくお願い申し上げます。

1972年12月11日

Rodney L. Hupp

ジョージ・ワシントン大学大学院

ロドニー・エル・ハフ

APPENDIX III

QUESTIONNAIRE

Please indicate your principal occupational activity by checking the appropriate items below:

For scientists:

_____ Social sciences

_____ Physical sciences

    _____ Atomic energy related

    _____ Non-atomic energy related

For political leaders:

_____ Diet member

    _____ Past or present member of a committee concerned with atomic energy policy

_____ Non-elected government administrator

Please answer the following questions by placing a check ( ) in the space to the left of the most appropriate response.

1. How frequently, on the average, do you have verbal or written contact with <u>scientists</u> who are involved in atomic energy development in Japan?

_____ Daily

_____ Once a week

_____ Once a month

_____ Once every six months

_____ Once a year

_____ Never

2. How frequently, on the average, do you have verbal or written contact with political decisionmakers who are involved in atomic energy development in Japan?

_____ Daily

_____ Once a week

_____ Once a month

_____ Once every six months

_____ Once a year

_____ Never

3. How would you describe the views of Japanese scientists on questions of atomic energy development policy?

_____ Close similarity of views among them

_____ Strong opposition of views among them

_____ Neither close similarity nor strong opposition of views

_____ No opinion

4. How would you describe the views of Japanese political decisionmakers on questions of atomic energy policy?

_____ Close similarity of views among them

_____ Strong opposition of views among them

_____ Neither close similarity nor strong opposition of views

_____ No opinion

5. How would you describe the relationship between Japanese scientists and Japanese political decisionmakers in the atomic energy policymaking process?

_____ Generally cooperative

_____ Generally antagonistic

_____ No overall relationship is discernible

_____ No opinion

6. Do you believe Japanese scientists understand the political implications of their scientific research and development, and do you believe they are, in fact, willing to take political issues into account when they formulate their research goals and methods?

_____ Both understand and take into account

_____ Neither understand nor take into account

_____ Understand but do not take into account

_____ Willing to take into account but do not understand

7. Do you believe Japanese political decisionmakers understand the significance for scientific research and development of their political acts, and do you believe they are willing to take this into account when formulating political decisions?

_____ Both understand and take into account

_____ Neither understand nor take into account

_____ Understand but do not take into account

_____ Willing to take into account but do not understand

8. Some people believe the primary goal of Japan's atomic energy program should be to provide cheap electric power for the public.

Other people believe the most important goal should be to achieve an independent atomic energy capability for Japan.

Which of these goals do you feel is most important?

_____ The most important goal is cheap electric power

_____ The most important goal is an independent atomic energy capability.

9. Some people believe that a scientist's professional activities should be confined to his scientific work, and that he should not become involved in debates on science policy or political issues relating to his work.

   Other people believe that it is the responsibility of a scientist to engage in policy discussion and political decisionmaking when it affects his scientific work.

   Which of these attitudes most closely reflects your own attitude?

   _____ A scientist should not become involved in science policy debates or political issues.

   _____ A scientist has a responsibility to become involved in science policy debates and political issues.

10. Some people believe that a society benefits from political controversy over the goals and priorities of scientific research and development because such debate helps scientists to determine the most socially beneficial projects to which they can devote their talents.

    Other people believe that political controversy slows the orderly progress of scientific development and results in a net loss for society.

    Which of these attitudes most closely reflects your own attitude?

    _____ Society benefits from political controversy over science.

    _____ Society loses from political controversy over science.

11. Some people believe that because scientists are the only people who understand complex scientific and technical matters, and since they advise political decisionmakers on alternative policy choices, the scientists in effect actually make policy instead of the political decisionmakers.

    Other people believe that scientists only advise policymakers when they are asked to do so, and that the actual power over alternative policy choices still rests with the political decisionmaker.

    Which of these attitudes most closely reflects your own attitude?

    _____ Scientists actually make policy decisions on scientific and technical issues.

    _____ Political decisionmakers actually make policy decisions on scientific and technical issues.

12. If a group of scientists serving as advisors to a political decisionmaker disagree on the correct advise to give him, what action to you feel they should take?

    _____ Give no advice until they can agree

    _____ Give only the opinion of the majority and do not state their different opinions to the political decisionmaker

    _____ State all their different opinions and leave the decision up to the political decisionmaker

    _____ Take some other action: ____________________

13. In your opinion, when scientific advisors are being selected by a political decisionmaker, how important should the opinion of the scientific community be and how important should the opinion of the political decisionmaker be in the selection of individual advisors?

    _____ The opinion of the scientific community is the most important factor.

    _____ The opinion of the political decisionmaker is the most important factor.

    _____ The opinion of the scientific community is somewhat more important than the opinion of the political decisionmaker.

    _____ The opinion of the political decisionmaker is somewhat more important than the opinion of the scientific community.

    _____ The opinions of both are of equal importance.

14. In your opinion, when scientific advisors in Japan are selected to advise Japanese political decisionmakers on atomic energy policy, how important is the opinion of the scientific community and how important is the opinion of the political decisionmaker in the selection of individual advisors?

    _____ The opinion of the scientific community is most important.

    _____ The opinion of the political decisionmaker is the most important.

    _____ The opinion of the scientific community is somewhat more important than the opinion of the political decisionmaker.

    _____ The opinion of the political decisionmaker is somewhat more important than the opinion of the scientific community.

    _____ The opinions of both are of equal importance.

15. To what extent do you believe a political decisionmaker should make the political beliefs of scientists a criterion for selecting his scientific advisors?

_____ He should choose only scientific advisors with political beliefs similar to his own.

_____ He should choose only scientific advisors with political beliefs different from his own.

_____ He should choose scientific advisors whose political beliefs are different from one another.

_____ He should not consider political beliefs at all in choosing scientific advisors.

16. When a political decisionmaker receives conflicting advice on a scientific question from two or more equally competent scientists, when action should he take to resolve the conflict?

_____ Take no action until there is agreement among all advisors

_____ Act on the advice of the majority of the advisors only

_____ Take all scientific opinions into account and then decide on the basis of which seems best suited to his own policy goals

_____ Take some other action: ____________________

17. Some people believe that any proliferation of nuclear weapons to states which do not possess them tends to de-stabilize the political and military relationship existing between countries at any given time.

Other people believe that if many countries have nuclear weapons, they will all deter each other from using their nuclear arms and the result will be great international stability.

Which of these attitudes most closely reflects your own attitude?

_____ Proliferation of nuclear weapons tends to be de-stabilizing.

_____ Proliferation of nuclear weapons tends to be stabilizing.

_____ Other: ____________________

18. Some people believe that if nuclear weapons begin to spread to other countries in addition to the present five nuclear weapons states, Japan will have no choice but to acquire nuclear weapons. What is your opinion?

_____ Japan will never need nuclear weapons now nor in the future.

_____ Japan will need nuclear weapons only if there is widespread proliferation (five or more countries in addition to the present nuclear weapons states).

_____ Japan will need nuclear weapons if certain specific countries acquire them first. These countries are _______________.

19. If an inspection procedure could be devised that would guarantee that the atomic industrial processes of various countries would not be divulged to competitors, would you support periodic inspections by the International Atomic Energy Agency or some other similar international organization to safeguard against the diversion of atomic energy technology and materials to military uses?

_____ Yes

_____ No

_____ No opinion

20. If such an international inspection agency (as described in question #19) were performing inspections, do you believe that each citizen in the countries under inspection should be <u>legally</u> required to report to the international inspectors any suspected diversion of peaceful atomic energy technology or materials to military uses?

_____ Yes

_____ No

_____ No opinion

21. If some person suspected that a military-related atomic energy development were occuring in his own country without the knowledge of the international inspectors mentioned above, do you believe that person would have a <u>personal</u> responsibility to report his suspicions to the inspectors, whether or not he was required by law to do so?

_____ Yes

_____ No

_____ No opinion

22. Do you believe Japan should ratify the Non-proliferation Treaty as it now stands?

_____ Yes

_____ No

_____ No opinion

23. If Japan were attacked with nuclear weapons, under what conditions do you believe the United States would actually fire nuclear weapons at the attacking state in Japan's defense (assuming Japan had no nuclear retaliatory force of her own)?

_____ The United States would fire nuclear weapons at any state that first fired nuclear weapons at Japan.

_____ The United States would fire nuclear weapons at another state in defense of Japan only if the United States also suffered a nuclear attack by that same state.

_____ The United States would never fire nuclear weapons at another state in defense of Japan.

_____ Other: ______________________________

24. Disregarding, for the moment, your own attitude on nuclear armaments in Japan, do you believe that Japan will acquire her own nuclear weapons in the future?

_____ Yes, within 5 years

_____ Yes, within 10 years

_____ Yes, within 20 years

_____ Yes, but it is impossible to say when

_____ No, Japan will never acquire nuclear weapons

_____ No opinion

25. If a zone were proposed for Northeast Asia in which all manufacture, introduction, and use of nuclear weapons were to be prohibited by international agreement, and if this proposal provided for adequate inspection by some international organization, do you believe Japan should become part of such a zone?

_____ Yes

_____ No

_____ No opinion

26. If atomic explosions for peaceful purposes like harbor construction and oil drilling become technologically feasible and economically attractive, from what source do you believe the explosive devices used in Japanese projects of this sort should come?

_____ Japan should develop her own atomic explosive devices for peaceful purposes.

_____ Japan should utilize explosive devices from some other country.

_____ Japan should utilize explosive devices from the International Atomic Energy Agency or some other similar international agency.

_____ Japan should under no circumstances use atomic explosions for peaceful purposes.

27. On what geographic level do you feel the beneficial aspects of atomic energy can best be fostered and the potentially destructive aspects of nuclear energy can best be controlled?

_____ National level

_____ Regional level

_____ Global level

28. Do you believe that the Japanese public has adequate information, or, could easily acquire adequate information, to engage in a rational discussion of the goals of Japan's atomic energy program?

_____ Yes

_____ No

_____ No opinion

29. Do you support direct participation in the decisionmaking process for atomic energy development of citizens groups like the Japan Fishermen's Association and the Japan Housewives' Association?

_____ Yes

_____ No

_____ No opinion

30. If a vote were taken or a survey were made of the residents in an area in which an atomic power plant was to be built, and these residents were shown to be very greatly opposed to locating a power plant in their community, would you be in favor of cancelling plans for the power plant in that particular area?

_____ Yes

_____ No

_____ No opinion

31. How do you believe that scientists and government policymakers working in the atomic energy development program can most effectively deal with public opposition to Japan's atomic energy program?

_____ Ignore public opposition

_____ Halt projects to which the public objects

_____ Educate the public on the atomic energy program

_____ Encourage civic groups to participate in policymaking

_____ Other: ____________________________________

32. How would you rate each of the following institutions as to the influence it has on the formulation of atomic energy policy in Japan?

	High	Moderate	Low
Atomic Energy Commission	____	____	____
Atomic Energy Bureau of the Science and Technology Agency	____	____	____
Diet Joint Committee on Science and Technology Promotion	____	____	____
Office of the Prime Minister	____	____	____
Ministry of International Trade and Industry	____	____	____
Japan Science Council	____	____	____
Science and Technology Council	____	____	____

33. How would you rate the level of research and practical application of atomic energy in the following countries as compared to Japan?

	Very Advanced	Advanced	About Equal to Japan	Less-Developed	Much Less Developed
China	____	____	____	____	____
India	____	____	____	____	____
Soviet Union	____	____	____	____	____
Great Britain	____	____	____	____	____
France	____	____	____	____	____
United States	____	____	____	____	____
West Germany	____	____	____	____	____

34. How accurately do you believe Japanese scientists are able to predict the political conditions of Japanese society over the next 30 years compared to the general population?

_____ Very well

_____ Moderately well

_____ Average

_____ Poorly

35. How accurately do you believe Japanese political decisionmakers are able to predict the political conditions of Japanese society over the next 30 years compared to the general population?

_____ Very well

_____ Moderately well

_____ Average

_____ Poorly

36. How accurately do you believe Japanese scientists are able to predict the changes that science and technology will bring about in Japanese society over the next 30 years compared to the general population?

_____ Very well

_____ Moderately well

_____ Average

_____ Poorly

37. How accurately do you believe Japanese political decisionmakers are able to predict the changes that science and technology will bring about in Japanese society over the next thirty years compared to the general population?

_____ Very well

_____ Moderately well

_____ Average

_____ Poorly

38. How would you rate the level of interest in domestic political issues among Japanese scientists?

_____ High

_____ Medium

_____ Low

_____ No opinion

39. In your opinion, how much importance do Japanese political decision-makers attach to atomic energy research and development?

_____ Very much

_____ Moderate

_____ Very little

_____ No opinion

40. Do you believe that atomic energy policy should be an issue in Japanese political elections or do you believe that atomic energy policy should not be an issue in elections?

_____ Should be an issue in elections

_____ Should not be an issue in elections

ア　ン　ケ　ー　ト

次の項目中、あなたの主要な職業活動の内容に当たるものに丸印をつけて下さい。

1 科学者の場合：

a 社会科学関係（人文科学を含む。）

b 自然科学関係

(i) 原子力関係

(ii) 原子力以外のエネルギー関係

2 政府・政界リーダーの場合：

a 国会議員

(i) 原子力政策に関する委員会の委員あるいは委員経験者

(ii) その他

b 選挙によらない行政官

次の質問につき最も適当な回答の左側に丸印をつけて下さい。

1 日本で原子力開発に従事している<u>科学者</u>と平均してどの程度、口頭または書状による接触がありますか。

a 毎日。

b 週に1回。

c 月に1回。

d 半年に1回。

e 年に1回。

f なし。

2 日本で原子力開発に従事している<u>政府・政界首脳部</u>と平均してどの程度、口頭又は書状による接触がありますか。

a 毎日。

b 週に1回。

c 月に1回。

d 半年に1回。

e 年に1回。

f なし。

3. 原子力開発政策の問題に関する日本の科学者の間での意見をどのように思いますか。

a 科学者の間での意見は類似している。

b 科学者の間で強い意見の対立がある。

c とくに意見の類似とか強い対立はない。

d 意見なし。

4. 原子力開発政策の問題に関する日本の政府・政界首脳部の間での意見をどのように思いますか。

a 政府・政界首脳部の間での意見は類似している。

b 政府・政界首脳部の間で強い意見の対立がある。

c とくに意見の類似とか強い対立はない。

d 意見なし。

5. 原子力政策の決定過程における日本の科学者と政府・政界首脳部との関係をどう思いますか。

a 一般に協力的な関係にある。

b 一般に対立的な関係にある。

c 特に協力的、対立的といつた関係は見出せない。

d 意見なし。

6. 日本の科学者は自己の科学研究，開発が持つ政治的意味というものを理解していると思いますか。また、実際に研究の目的や方法を決めるときに、このような政治的意味を考慮しようと心がけていると思いますか。

a 理解しており、また、考慮しようと心がけている。

b 理解もせず、また考考慮しようともしていない。

c 理解はしているが、考慮しようとはしていない。

d 考慮しようとはしているが、理解していない。

7. 日本の政府・政界首脳部は、自己の政治的活動が、科学研究・開発に対して持つ意義というものを理解していると思いますか。また、政治的な決定を行なう際に、上のような科学研究・開発に対して持つ意味を考慮しようと心がけていると思いますか。

a　理解しており、また、考慮しようと心がけている。

b　理解もせず、また、考慮しようともしていない。

c　理解はしているが、考慮しようとはしていない。

d　考慮しようとはしているが、理解していない。

8　日本の原子力計画の第一の目的は人々に安価な電力を供給することであるべきだという考え方と、原子力計画のもっとも重要な目的は日本が独自の原子力能力を持つことであるべきだという考え方とがあります。これらの二つの目的のうち、あなたはどちらがもつとも重要な目的だと思いますか。

a　安価な電力を供給することがもっとも重要な目的である。

b　独自の原子力能力を持つことがもっとも重要な目的である。

9　科学者の職業活動は科学的研究の分野にだけ限られるべきで、自分の仕事に関係ある科学政策や政治的問題の論争にまき込まれてはならないという考え方と、科学者は自己の研究活動に影響がある場合には、政策論争や政策決定に関与する責任があるという考え方とがあります。これら二つの意見のうち、どちらがあなた御自身の考え方に近いと思いますか。

a　科学者は、科学政策論争や政治的問題にまき込まれるべきではない。

b　科学者は、科学政策論争や政治的問題に関与する責任がある。

10　科学研究・開発の目的や優先度に関する政治的論争について、一方では、そのような討論は、科学者が自己の才能を傾注するに足るもっとも社会的に意味のあるプロジェクトを選択するのに役立つから社会的にプラスだという意見があり、また他方では、そのような政治的論争は科学の秩序ある進歩をむしろ遅らせ、社会にとって結局はマイナスだという意見があります。

これら二つの意見のうち、どちらがあなた御自身のお考えに近いと思いますか。

a　科学に関する政治的論争は、社会にとつてプラスである。

b　科学に関する政治的論争は、社会にとつてマイナスである。

11　複雑な科学技術問題がわかるのは、科学者だけであり、また、いろいろな政策の選択について、政府・政界首脳部に助言を与えるのは科学者であるから、実際に政策を決めているのは、実は政府・政界首脳部ではなく科学者にほかならないという考え方がある一方、科学者は依頼された時にだけ、政府政界首脳部を助言するにすぎず、いろいろな政策の選択にあたつて実際の権力はやはり政府・政界首脳部にある

という考え方があります。

これら二つの意見のうち、どちらがあなた御自身のお考えに近いと思いますか。

a　科学者が、実際には、科学・技術の問題について政策を決定している。

b　政府・政界首脳部が、実際には、科学・技術の問題について政策を決定している。

12　仮に、政府・政界首脳者の助言者になつている科学者グループの中で、与えるべき助言について意見の不一致がある場合、それらの科学者はどのような行動をとるべきだとあなたは思いますか。

a　科学者の間で合意ができるまで助言しない。

b　多数意見を助言し、異なる意見については何も述べない。

c　異なる意見をそのまま述べて、決定は政府・政界首脳部にまかせる。

d　その他の行動をとる。（その他とは、＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）

13　政府・政界首脳者が科学者の助言者を選ぶ場合に、学界の意見はどの程度重視されるべきだと思いますか。また、政府・政界首脳者自身の意見はどの程度重視されるべきだと思いますか。

a　学界の意見が、唯一のもつとも重要な要因である。

b　政府・政界首脳者の意見が、唯一のもつとも重要な要因である。

c　学界の意見の方が、政府・政界首脳者の意見よりやや重要である。

d　政府・政界首脳者の意見の方が、学界の意見よりやや重要である。

e　双方の意見ともに、等しく重要である。

14　日本で、政府・政界首脳部が原子力政策に関する科学者の助言者を選ぶ場合に、学界の意見はどの程度重視されていると思いますか。また、政府・政界首脳者自身の意見はどの程度重視されていると思いますか。

a　学界の意見がもつとも重視されている。

b　政府・政界首脳者の意見がもつとも重視されている。

c　学界の意見の方が、政府・政界首脳者の意見よりやや重視されている。

d　政府・政界首脳者の意見の方が、学界の意見よりやや重視されている。

e　双方の意見ともに、等しく重視されている。

15. 科学者の助言者を選ぶ場合に、政府・政界首脳者は、どの程度科学者の政治的信念を基準にすべきだと思いますか。

a 政府・政界首脳者自身と同様の政治的信念を持つている科学者のみを選ぶべきである。

b 政府・政界首脳者自身と異なる政治的信念を持つている科学者のみを選ぶべきである。

c 相互に異なつた政治的信念を持つている科学者達を選ぶべきである。

d 科学者の助言者を選ぶ場合に、その政治的信念は考慮すべきでない。

16 二人かそれ以上のともに有能な科学者から科学的問題について矛盾する助言を受けた場合、政府・政界首脳者は、その矛盾を解決するために、どのような行動をとるべきだと思いますか。

a 助言者全員の意見が、一致するまで何もしない。

b 助言者の多数意見にのみ従つて行動する。

c 科学者の意見すべてを考慮し、自らの政策目標にもつとも適していると思われる意見をとる。

d その他の行動をとる。（その他とは________________________）

17 核兵器非保有国への核兵器の拡散は、いかなる場合にせよ国際間の政治的・軍事的関係を不安定にするという考え方がある一方、また、多数の国が核兵器を保持することは、むしろ相互に核兵器使用を制御することにつながる結果、国際関係を安定化するという考え方があります。これら二つの考え方のうち、どちらがあなた御自身のお考えに近いと思いますか。

a 核兵器の拡散は、国際関係の不安定化につながる。

b 核兵器の拡散は、国際関係の安定化につながる。

c その他（その他とは、________________________________）

18 もし現在の核兵器保有五カ国以外の国々に核兵器の拡散が起こるとしたら、日本は核兵器を保持するほか道がないとする考え方があります。あなたの御意見をお聞かせ下さい。

a 日本は、現在においても、将来においても、決して核兵器を必要としない。

b 広範囲の拡散（現在の核兵器保有国以外の五カ国ないしはそれ以上の国々が核保有国になること）が起こる場合に限り、日本は核兵器を必要とする。

c ある特定の国々が先に核兵器を保有するようになる場合に、日本は核兵器を必要とする。

（その特定の国々とは、＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）

19 もし、各国の原子力製造工程が競争者にもれないことを保証するに足る査察の方法が考案されたとした場合、原子力技術や資料が軍事目的に転用されることを防ぐため、国際原子力機構ないしはそれと同様の国際機構が定期的査察を行なうことを支持しますか。

a 支持する。

b 支持しない。

c 意見なし。

20 もし前項で触れたような国際的な査察機構が査察を行なうようになつたと仮定した場合、査察下にある国々の国民は、平和利用のための原子力技術や資料の軍事目的への転用が行なわれているという疑いがあるときは、必ず国際査察機構の職員に報告するよう法律で義務づけられるべきだと思いますか。

a 法律で義務づけられるべきだと思う。

b 法律で義務づけられるべきだと思わない。

c 意見なし。

21 もし前述した国際的査察機構が知らない間に自国で軍事関係の原子力開発が行なわれているという疑いを持つた人がいたと仮定した場合、その人は、法律で義務づけられるか否かは別として、その疑いを査察機構に対し報告する個人としての責任があると思いますか。

a 責任があると思う。

b　責任があると思わない。

c　意見なし。

22　現在のままの核拡散防止条約を、日本は批准すべきだと思いますか。

a　批准すべきだと思う。

b　批准すべきだと思わない。

c　意見なし。

23　仮に日本が核兵器で攻撃されたとした場合、どのような条件の下で、米国は、日本の防衛のために、その攻撃国に対し核兵器で反撃すると思いますか。（日本は独自の核反撃力を持つていないと仮定します。）

a　米国は、最初に日本を核攻撃したいかなる国に対しても核兵器で反撃する。

b　同じ国によつて自国も核攻撃された場合にのみ、米国は、日本防衛のために、核兵器で反撃する。

c　米国は、日本の防衛のためには、決して他国に核兵器で反撃しない。

d　その他（その他とは、＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）

24　日本の核武装に関するあなた御自身の主張をはなれて考えた場合、将来、日本は、核武装をすると思いますか。

a　5年以内に核武装をする。

b　10年以内に核武装をする。

c　20年以内に核武装をする。

d　いつまでということは難しいが、核武装をする。

e　日本は絶対に核武装をしない。

f　意見なし。

7

25. もし北東アジアについて、国際協定によりすべての核兵器の製造と導入と使用が禁止される地域が提案されるとし、しかもその提案が国際機構による適切な査察の規定を含んでいるとした場合、日本はそのような地域に入るべきだと思いますか。

a 入るべきだと思う。

b 入るべきだと思わない。

c 意見なし。

26. 仮に港湾建設や石油採掘など平和目的のための原子力爆発が技術的に可能で、しかも経済的に有利なものとなつたとした場合、日本でのこの種のプロジェクトに使われる爆発装置は、どこから入手されるべきだと思いますか。

a 日本は、平和目的のための爆発装置を自国で開発すべきである。

b 日本は、他国から爆発装置を入手して利用すべきである。

c 日本は、国際原子力機構ないしはそれと同様の国際機構から爆発装置を入手し、利用すべきである。

d 日本は、どのような場合でも絶対に、平和目的のため、原子力爆発を用いるべきではない。

27. 原子力の有益な側面を生かし、かつ、その破壊的側面を制御することは、下記のうちどの地理的レベルで、もつとも効果的に行なうことができると思いますか。

a 国家のレベル

b (国家を超えた)地域(region)のレベル

c 世界のレベル

28. 日本の国民は、日本の原子力計画の目的について理性的な討議をするのに十分な情報を持つている(ないしは、十分な情報を容易に得られる)と思いますか。

a 情報を持つている(ないしは、得られる)と思う。

b 情報を持つている(ないしは、得られる)と思わない。

c 意見なし。

7

29. 日本漁業連や主婦連のような市民団体が原子力開発政策の決定過程に直接に参加するのを支持しますか。

a 支持する。

b 支持しない。

c 意見なし。

30. 原子力発電所の建設予定地域で住民投票ないしは意見調査が行なわれ、その結果、住民がその発電所の建設に強く反対しているのが明らかになったとした場合、その地域での発電所建設計画の取消しを支持しますか。

a 支持する。

b 支持しない。

c 意見なし。

31. 原子力開発計画に従事している科学者や政府首脳部は、日本の原子力計画に対する国民の反対運動が起った場合に、どのようにしたらそれにもっとも効果的に対処できると思いますか。

a 国民の反対を無視する。

b 国民が反対しているプロジェクトを中止する。

c 原子力計画について国民を教育する。

d 市民団体が政策決定に参加するよう勧奨する。

e その他（その他とは、＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿）

32. 日本の原子力政策の決定に次の機関がもつ影響力をどのように評価しますか。

	強い	普通	弱い
原子力委員会			
科学技術庁原子力局			
衆参両院の科学技術振興対策特別委員会			
総理府			
通商産業省			
日本学術会議			
科学技術会議			

33. 日本と比較して、次の国々の原子力研究とその実際的応用のレベルを、どのように評価しますか。

	日本より非常に進んでいる	日本より進んでいる	日本とほぼ同じ	日本より遅れている	日本より非常に遅れている
中国	______	______	______	______	______
インド	______	______	______	______	______
ソ連	______	______	______	______	______
英国	______	______	______	______	______
フランス	______	______	______	______	______
米国	______	______	______	______	______
西独	______	______	______	______	______

34. 一般大衆と比較して、どの程度正確に、日本の科学者は、30年後の日本社会の政治的情況を予測できると思いますか。

a 非常に正確に予測できる。

b かなり正確に予測できる。

c 普通。

d あまり正確に予測できない。

35. 一般大衆と比較して、どの程度正確に、日本の政府・政界首脳部は、30年後の日本社会の政治的情況を予測できると思いますか。

a 非常に正確に予測できる。

b かなり正確に予測できる。

c 普通。

d あまり正確に予測できない。

36. 一般大衆と比較して、どの程度正確に、日本の科学者は、30年後に科学技術が日本の社会にもたらす変化を予測できると思いますか。

a 非常に正確に予測できる。

b かなり正確に予測できる。

c 普通。

d あまり正確に予測できない。

３７　一般大衆と比較して、どの程度正確に、日本の政府・政界首脳部は、３０年後に科学技術が日本の社会にもたらす変化を予測できると思いますか。

a　非常に正確に予測できる。

b　かなり正確に予測できる。

c　普通。

d　あまり正確に予測できない。

３８　日本の科学者の間での国内政治問題に対する関心の程度をどのように評価しますか。

a　関心が高い。

b　普通。

c　関心が低い。

d　意見なし。

３９　日本の政府・政界首脳部は、原子力研究・開発をどの程度重視していると思いますか。

a　大変重視している。

b　普通。

c　ほとんど重視していない。

d　意見なし。

４０　原子力政策は、日本での選挙の争点になるべきだと思いますか。それとも、それは選挙の争点になるべきではないと思いますか。

a　選挙の争点になるべきである。

b　選挙の争点になるべきではない。

APPENDIX V

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Mr. Hiroichi HIROSHIGE	" "
Mr. Toshihiro ISHII	" "
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Mr. K. Yo	

* Do not reverse the surname and given name.

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