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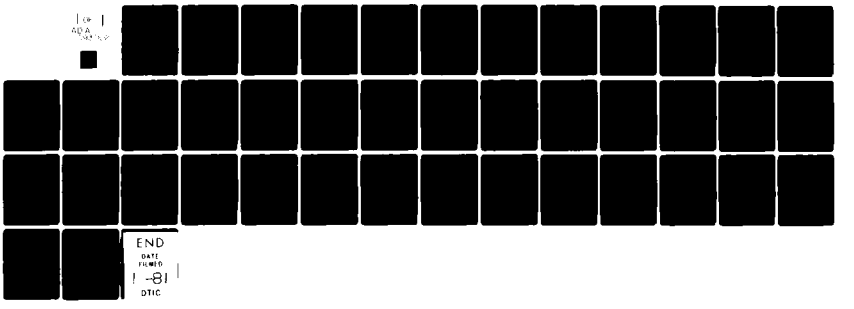

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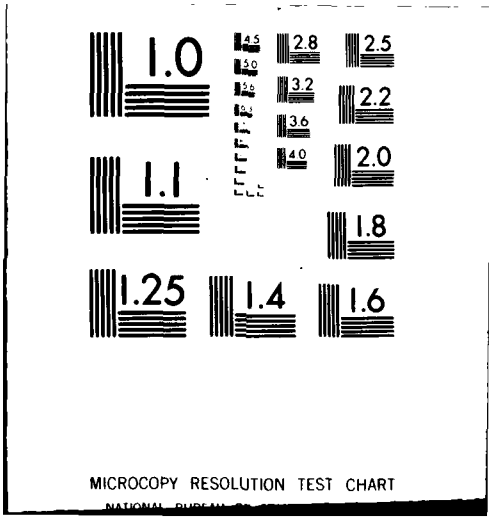
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STRENGTHENING THE INTERNATIONAL SAFEGUARDS SYSTEM, Institutional and Financial Issues,

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Paper prepared for the Annual Meeting of the International Studies Association, Washington, D.C., February 22-26, 1978

DEPARTMENT OF STATE

Washington, D.C. 20520

February 6, 1980

Mr. Harry Schrecengost
Defense Technical Information
Center
Cameron Station
Alexandria, Va. 22314

Dear Mr. Schrecengost:

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Permission is also granted to further disseminate these documents into the private sector through the National Technical Information Service of the U.S. Department of Commerce.

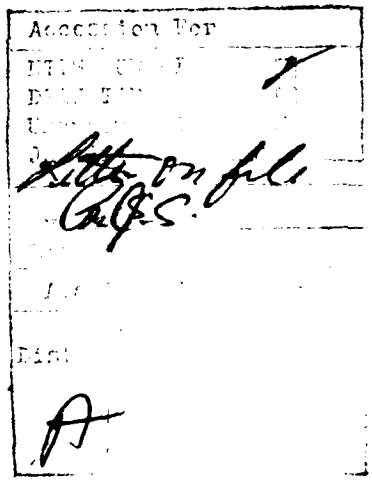
Sincerely,

Edward N. Lundstrom

Edward N. Lundstrom
Research Documentation Officer
Office of External Research
Bureau of Intelligence and Research

Abstract

The purpose of this paper is to clarify the role and resources of the International Atomic Energy Agency in expanding and strengthening the international nuclear safeguards system. In addition to describing the IAEA's budget process and structure, the paper presents forecasts of the expected increases in civil nuclear energy capacities that will impose greater demands on the safeguards system in the future; it discusses evidence concerning the economic and political constraints that impinge on the IAEA's programs; and it analyzes data on the trends in program priorities and the relationship between demands on the Agency's safeguards program and its resources. United States' support processes and priorities receive special attention.



Author's Note

Thomas L. Brewer is Associate Professor of Political Science at Eastern Michigan University and Adjunct Associate Professor of Political Science at the University of Michigan. He is indebted to the Inter-University Seminar on Armed Forces and Society for a grant supporting his research on the IAEA. Some of the material in this paper is based on interviews with IAEA and U.S. Mission officials, to whom he is also indebted.
This paper was originally prepared for the Annual Meeting of the International Studies Association, Washington, D.C., 1978.

CONCERNS ABOUT THE IAEA'S SAFEGUARDS SYSTEM

Although there is now widespread recognition that the international safeguards system cannot prevent the proliferation of nuclear weapons, there is also a clear consensus among informed observors that it nevertheless can serve some useful functions. In particular, to the extent that it threatens to detect a diversion of materials from the civil fuel cycle to weapons fabrication, it can serve to deter such a diversion. While most analyses have focused on this negative, deterrent function, the system can also serve a complementary positive function as well. For it may serve to assure other countries that any given country where safeguards are applied has in fact not acquired nuclear weapons. Thus, it reduces the conflict potential inherent in the suspicions that would be more prevalent in the absence of such assurances.

In its present form, however, the system suffers from numerous serious flaws. Its actual performance of the deterrence and assurance functions is substantially limited by a variety of political, administrative, and technical problems. Many countries have refused to accede to the Non-Proliferation Treaty and have thereby excluded facilities from the purview of the safeguards system.[1] Reports of the results of inspections and other safeguards procedures receive quite limited distribution and thereby feed doubts about their conclusiveness.[2] When samples of materials undergo laboratory analysis to check the accuracy of materials flows records, the sample sizes and measurement errors are such that there is a 5% or so chance that a diversion has occurred even though the sample measurement data indicate

that it has not.[3] These problems and others have recently been receiving considerable attention as strengthening the international safeguards system has become a central foreign policy issue.

In addition to issues about strengthening the system, there are also questions about expanding the system. Since the levels of nuclear energy activities are likely to increase at a more rapid pace over the next several years and perhaps even decades, the safeguards system will of course also have to expand to maintain even only minimal standards of effectiveness.[5] Some rough forecasts of nuclear power plant capacities are indicated in Figure 1. Although there is still considerable uncertainty

(Figure 1 here)

about the future of nuclear power, even rather conservative assumptions lead to forecasts of a tripling of worldwide power reactor capacities over the next decade. Such levels would be obtained even if only those reactors operable or under construction as of early 1977 were to be on-line in a decade. Much--perhaps most--of the increases furthermore will be in countries that do not presently have nuclear weapons. Finally, enrichment and reprocessing facilities providing the fuel for such an expanded reactor capacity would place particularly great burdens on the safeguards system.[7]

There may be uncertainties about the degree of expansion of the safeguards system that will be necessary and there may be doubts about the technical, administrative, and political feasibility of various ways to strengthen the system, but one thing is certain: expanding and strengthening the system require resources. Thus, there has been concern about whether the International Atomic Energy Agency (IAEA), which administers the

safeguards system, has been or will be sufficiently responsive to the challenge to strengthen and expand its safeguards program. Some observers, for instance, have wondered whether the Agency's dual role as both promoter and regulator of peaceful nuclear energy activities may inhibit its regulatory programs.[8] Perhaps just as the U.S. Atomic Energy Commission gave priority to its developmental programs and neglected its regulatory programs, so also has the IAEA. Therefore, it is often argued, the IAEA should be split into two separate organizations for developmental and regulatory programs, just as the US AEC was split into the Energy Research and Development Administration and the Nuclear Regulatory Commission. Others have proposed that all U.S. contributions to the IAEA be limited to its safeguards program only.[9]

Furthermore, the IAEA has often been noted to be one of the smallest international organizations in the United Nations system; and its safeguards program in particular is widely perceived as a "shoestring" operation. Moreover, its secretariat has been noted to be fiscally conservative and not prone to bureaucratic expansionism.[10]

Other considerations, on the other hand, suggest that such concerns may be exaggerated. Forecasts of increases in nuclear energy activites for the rest of the century have been revised substantially downward in recent years. The prospects for plutonium reprocessing are in doubt. Earlier estimates of demands on the safeguards system and the requisite personnel and financial resources turned out to be much greater than the eventual actual levels. International organizations in general have recently been expanding their budgets considerably.

Thus, we have two sets of contradictory assumptions and expectations--which suggests the need for a systematic analysis of the available evidence.

PURPOSE

The purpose of this paper is to clarify the role and resources of the IAEA in strengthening and expanding the safeguards system. It examines in turn: the Agency's revenues, organization, and budget process; the economic and political constraints that affect the level and distribution of its resources; and the trends in its safeguards and technical assistance programs' burdens and resources.

THE AGENCY's REVENUES, ORGANIZATION, AND BUDGET PROCESS

In order to understand the Agency's role in the safeguards system and the process for providing its resources, certain administrative details need some attention. Like other international organizations, the IAEA relies on several different revenue sources. The principal source is the obligatory "assessed contributions" of all of its member states. These assessed contributions are made on the same basis as the scale adopted each year by the United Nations--with two adjustments. Since the IAEA's membership of 110 is smaller than the UN's, small upward adjustments must be made in each member's share. Also, the assessments for the safeguards portion of the Agency's budget are based on a slightly different scale since the less developed countries are exempt from the safeguards assessment. The composite assessments for all members are indicated in Table 1.

(Table 1 here)

Together with some minor miscellaneous revenues, these funds support the Agency's Regular Budget, which includes all or part of the expenses associated with each of the Agency's numerous programs.

A second major source of funds is the "voluntary contributions" of some of its members. Annual total "target" figures are set for these contributions to the Agency. Pledges to contribute are made by individual governments and then fulfilled in whole or in part (or sometimes not at all) on a non-obligatory basis. U.S. policy has been to limit contributions to 40% of the total target.[11] Recent levels of voluntary contributions are indicated in Table 1. These contributions are all designated for the Agency's Operational Budget and specifically its technical assistance program, which provides expert personnel, equipment, fellowships, and other training activities for the developing countries.

In addition, the Agency receives annual contributions from other international organizations in the UN system--including the UN Development Program, the UN Environment Program, and the Food and Agriculture Organization. Although the IAEA uses these funds to support some of its own programs, the amounts contributed and their purposes are determined through consultations between the IAEA and the contributing organization.

The Agency also receives special " contributions" from some member states, which have decided the amounts and purposes of each contribution in consultation with the Agency--perhaps for the safeguards program or the technical assistance program or the environment program.

Altogether, these several sources currently provide the Agency with approximately $60 million in annual financial resources. (Member states also make in-kind contributions, which are not reflected in these revenue figures or in budget outlay figures.) Table 2 provides revenue figures for 1977.

(Table 2 here)

In sum, although the Agency's secretariat is directly involved in the administration of funds (and in-kind contributions) from numerous sources, its involvement in the budgeting of those funds for specific programs varies considerably. It initiates detailed budget proposals for the expenditures of assessed contributions for its Regular Budget, but it plays a more passive role in determining the levels and purposes of funds from the voluntary contributions and special contributions of its members and the contributions of other international organizations. Furthermore, the Agency is highly dependent on the monetary and in-kind contributions from the United States and a few other countries.[12]

The predominance of the United States and a few other countries in Agency policymaking is also evident in the Agency's budgeting process in other respects. Although the secretariat of course plays a central role in the formulation of the budget,[13] and although the entire membership (acting as the General Conference) must formally approve it, power in the budgetary process lies primarily in the Committee on Administration and Budget of the Board of Governors.[14] The Committee's membership is divided about evenly between industrialized and developing countries, but the US, USSR, UK, France, and FRG play the central roles in its activities.[15] In short, the budgetary process is

democratic in form, but bureaucratic and oligarchic in essence.[16]

Since it does not exist in an economic or political vacuum, however, let us consider the economic and political constraints impinging on it.

ECONOMIC CONSTRAINTS

We have noted that the IAEA is often considered a fiscally conservative pygmy in the UN system. The data in Table 3 indicate that there are indeed more than a dozen other organizations in the

(Table 3 here)

UN system with larger budgets. In fact, the major financial institutions have budgets more than a hundred times greater than the IAEA's, and many organizations have more rapidly growing budgets. But the IAEA's recent budget growth has been rather typical for the group of organizations in the UN system as a whole.[17] Along with many other organizations, its budget more than doubled, in current dollar terms, between 1970 and 1975--figures suggesting that it has not been particularly fiscally conservative in the recent past. However, such figures substantially exaggerate the growth rate. For they do not take into account the effects of inflation rates or currency exchange rates--both of which have had pronounced effects on the budgets of international organizations.[18] Thus, to obtain a more meaningful estimate of the recent increases in the IAEA's resources, we need to deflate those figures. In Table 4, the apparent 120% increase from 1970 to 1975 becomes

(Table 4 here)

only 34%--or an average of only about 7% per year. Although this

may be only rather typical of international organizations, it is about twice the increase in US federal government expenditures in real terms over the same period. Furthermore, it is nearly twice as great as the real increase in World Gross Domestic Product over that period. The moderate independence of the real increases in IAEA program support from price changes and world income changes is also evident in the data on annual changes in Figures 2 and 3.[19]

(Figures 2 and 3 here)

In short, although the IAEA's programs are surely affected to some extent by income, price, and currency constraints, there is evidence here that the Agency has been able to increase its resources in real terms at greater rates than one might expect and to do so somewhat independently of the annual fluctuations in those constraints.

POLITICAL CONSTRAINTS

Economic constraints, in any case, would tend to impinge directly on budget totals and only indirectly on particular program resources. Yet we are of course interested not only in the Agency's aggregate budget trends, but also in the trends in particular programs, especially the safeguards program. So we need to disaggregate the budget figures to examine the shares allocated to the programs which inevitably compete for the scarce resources represented in the budget totals. And of course it is in this allocation that we would expect political pressures and constraints to be most directly operative. For the conflicting interests and priorities within the secretariat and among the member states

are naturally reflected in the different purposes of the programs. Furthermore, much of the concern about the IAEA--at least in the United States-- has been focused precisely on its program priorities.

There are three different but overlapping sets of conflicting political pressures and constraints that have impinged on the programmatic allocation of the Agency's resources. One set, which was operative early in the Agency's history but apparently not since the mid-1960's, was the "cold war" conflict. In the late 1950's and early 1960's, the Soviet Union resisted American attempts to give greater priority to the safeguards program. But since the mid to late 1960's, the Soviet-American conflicts have not intruded much at all into Agency affairs.[20]

A second set of political constraints that has been operative in Agency affairs is the conflict between the industrialized members (nuclear suppliers) and the developing countries (actual and potential recipients of nuclear assistance and supplies). The latter of course place priority on the Agency's promotional programs, especially technical assistance, while at least some of the former emphasize its regulatory programs, especially safeguards.[21] This has been a continuing conflict since the Agency's inception.

A third conflict, which has become more evident recently, is the transnational and transgovernmental conflict between the promoters and the regulators of nuclear energy. In this case, the lines of conflict do not coincide with national boundaries but rather cut across them and tend to follow intra-national as well as intra-agency lines.[22]

The IAEA's budget priorities therefore represent to some degree the (compromise) outcomes of such international, transnational, and organizational conflicts. The resulting patterns and trends in the priorities are indicated in Figure 4.

(Figure 4 here)

The data there support several summary observations. In the first place, the Agency's Regular and Operational Budget resources from members' assessed and voluntary contribtuions have been substantially devoted to promotional or developmental programs. Throughout its history, one-half to two-thirds of those resources have gone directly into promotional programs, while only about one-fourth or less have gone into regulatory programs. The balance of about one-fourth have gone directly into the general administrative and support programs (and of course indirectly into the promotional and regulatory programs). Approximately, then, the Agency's priorities have been between 2:1 and 4:1 in favor of promotional over regulatory activities. Secondly, however, there are some clear trends in the changing shares. During the Agency's first decade, there was a shift toward increasing dominance of promotional programs, while in the second decade there has been a shift toward less dominance.

Thus, the current pattern is that promotional program resources dominate regulatory program resources by nearly 2:1 (respectively about 50% and 30% of the total), but the trends are that the share for the regulatory programs is increasing and the share for the promotional programs is decreasing. Put simply,

the IAEA is still predominantly a promotional-developmental agency rather than a regulatory agency, but it is less so today than a decade ago, no more so than it was at its outset, and is apparently in the process of becoming even less so.

Much of the interest in the Agency's priorities, however, has focused specifically on two programs--safeguards and technical assistance. Although the Agency conducts only two regulatory programs--safeguards, and safety and environmental protection--it conducts numerous promotional-developmental programs in addition to technical assistance. But the technical assistance program is the one of most concern since it directly fosters the spread of nuclear facilities and technical knowledge that could contribute to the spread of nuclear weapons. In Figure 5,

(Figure 5 here)

the trends in the safeguards and technical assistance programs' shares of the Agency's resources indicate substantial changes in the priorities. Whereas technical assistance has declined from about two-fifths of the total in its early years to about one-fifth in recent years, safeguards resources have increased from about one-tenth to over one-fourth. Thus, the technical assistance and safeguards programs now receive approximately the same shares.

PROGRAM RESOURCES IN RELATION TO DEMANDS ON THEM

Program priorities are not only the result of political pressures in the competition for scarce resources. They are also at least in part the result of varying needs for the services they provide. Thus, we can examine the safeguards and technical

assistance program resources in relation to the demands placed on them--by the facilities under safeguards and the requests for technical assistance.

We have just seen that the share of the IAEA's own resources going to the technical assistance program has declined substantially over the years. But the Agency's technical assistance program receives substantial funding from extra-agency sources. In particular, in recent years it has received several million dollars from the UN Development Program; it also receives special contributions from individual governments. The data in Figure 6

(Figure 6 here)

include such resources as well as those included in the Agency's own Regular and Operational Budgets. Even the top set of data in that figure contain a distorting factor, however, since price increases alone account for most of the apparent increase in the gap between the requested and provided assistance. Thus, the proportion provided (section B in Figure 6) has remained relatively stable between 30% and 50%. Furthermore, the Agency provides assistance only to those projects it finds technically sound.[23] Since there is probably some "padding" in the requests and since many of them may not even be technically sound, the proportion of the real need being satisfied is probably greater--and in any case again fairly stable over time. In short, even though the Agency's own Regular and Operational Budget resources going to technical assistance have constituted a declining share, its total technical assistance resources have increased at about the same rate as requests for such assistance.

The trend in the relation between demands on the safeguards program and its resources has been similar. There is no single perfect measure for the demands placed on the safeguards system since the resources required for safeguarding vary with the type and location of facilities. However, since the mixture of types and locations of facilities under safeguards has remained fairly constant until recently, the total number of facilities under safeguards provides a decent measure of the burdens on the safeguards system. Figure 7 thus plots the total number of personnel in the IAEA's Department of Safeguards and Inspection.

(Figure 7 here)

Over the past decade the ratio of burdens to resources has remained fairly constant at about 2 facilities per staff member, though with a slight overall decline. Two caveats about interpreting this decline should be noted, however. One is that there may have been administrative economies of scale so that resources would not have to increase in direct proportion to increases in the facilities.[24] The second is that the recent dip in the ratio is due to the entry into force of the safeguards agreement with Euratom in the fall of 1977. Because of the existence of a Euratom safeguards program and because of the close proximity of the European facilities to the IAEA headquarters in Vienna, the European-Euratom facilities should naturally constitute a proportionately smaller burden on the IAEA safeguards resources than most other facilities.

In other words, over the years the IAEA's safeguards personnel resources have increased at roughly the same rate

(or perhaps at a slightly slower rate) in comparison with the rate of increase in the burdens on them. But is that enough? The secretariat seems to believe that it has been--at least in a technical-administrative sense. (Indeed for awhile there were several authorized safeguards positions left unfilled when the actual increase in safeguarded facilities was smaller than the anticipated increase.) Whether it is enough in a larger political sense, however, is debatable since any perceived inadquacy undermines its credibility and hence its effectiveness. In any case, the figures do clearly indicate that the Agency has been able to increase its safeguards resources as the burdens on them increased; it has not been so dominated by promotional programs or so constrained by pressures for more technical assistance as to prevent an expansion of its safeguards program.

CONCLUSION

In sum, the Agency's programs and priorities have shifted over time, and its safeguards program in particular has been able to increase its resources generally in proportion to increases in the burdens on it. To the extent that the past is indicative of the future, such data on institutional resources suggest that the most significant obstacles to strengthening and expanding the safeguards system are likely to continue to lie elsewhere. Although the political effectiveness of the safeguards system apparently requires more than a continuation of proportional increases in its resources as the burdens on it increase and although the provision of ample resources for the system surely

requires continuing attention, it would be unfortunate if such concerns allowed attention to be diverted from the more fundamental and problematic obstacles to strengthening the safeguards system. In the first place, there are the ultimately determining larger political obstacles--such as some countries' refusal to accept or impose as a condition of transfer full fuel cycle safeguards. Secondly, there are the problems involved in upgrading the technical capabilities of the system--such as the need for greater measurement accuracies. Finally, there are several issues concerning the basic political-administrative procedures of the system--such as the dependence on national accounting records and the limited distribution of the results of the verification procedures. In spite of such shortcomings, however, and in spite of the political, administrative, and technical difficulties involved in strengthening the system, its actual and potential benefits are surely worth the relatively modest resources the system has been receiving and the substantial increases in those resources it is likely to continue to need.

Appendix

U.S. SUPPORT OF THE IAEA

The purpose of this appendix is to clarify the processes and priorities in United States' support of the IAEA. It thus provides detailed information pertinent to certain issues that have been raised about American relations with the IAEA.

One issue is the extent to which the budget process serves as a political-administrative procedure for evaluating programs, setting priorities, and generally enabling politically responsible officials (particularly in Congress) to review and influence IAEA activities.[25] As we have already observed in the body of the paper, the IAEA relies on a variety of types of support--a fact that is reflected in the national budgeting process. Thus, some U.S. contributions are in the form of cash, while others are in the form of personnel, equipment, and other in-kind resources. Some contributions are obligatory responses to annual assessments, while others are voluntary responses to annual targets, and still others are ad hoc responses to particular perceived needs. Further, while most support goes directly to the IAEA, some support goes to it only indirectly via other international organizations. The numerous channels of U.S. support are summarized in Table A.1. A result of this multiplicity of

(Table A.1 here)

support channels is that there are numerous executive agencies and Congressional subcommittees involved in several separate budgeting processes--a fragmentation that is of course common in budgeting processes in the United States. Although the

existence of the indirect channels by which funds are transferred by other international organizations to the IAEA surely adds to the fragmentation of the process, the amounts of money involved are relatively small--only about $1 million currently (Table A.2).

(Table A.2 here)

Support priorities do result (albeit perhaps only willy nilly) from such a process. Those priorities are indicated in the figures of Table A.3--which were computed on the basis of the complex combinations of the amounts, forms, and end uses of U.S. contributions, as determined from both IAEA and U.S. documents. The figures reveal that about one-half of U.S.-provided resources go to developmental programs, about one-third to regulatory programs, and about one-sixth to administration and support. About three-tenths go to the safeguards program in particular (and a similar proportion to technical assistance).

In sum, U.S. support of the IAEA is provided through a complex, confusing, fragmented budget process which gives priority to IAEA developmental programs over its regulatory programs at a ratio of about 3:2 and which gives about equal priority to its safeguards and technical assistance programs.

Notes

1. The exclusion of some facilities from the safeguards system is not presently such a severe problem as is commonly supposed. As of December, 1976, there were only three facilities in three non-nuclear-weapon countries (Egypt, South Africa, and Spain) known to be excluded from IAEA safeguards. Stockholm International Peace Research Institute, World Armaments and Disarmament (Stockholm: Stockholm International Peace Research Institute, 1977), p. 51, reprinted in U.S. Congress, Office of Technology Assessment, Nuclear Proliferation and Safeguards (New York:Praeger, 1977), p.419. The problem could of course become quite severe in the future unless many more countries become parties to the NonProliferation Treaty or otherwise accept comprehensive safeguards.

A 1977 change in the procedures for distributing the reports means that they are now available to the IAEA Board of Governors as well as the Safeguards Secretariat.

3. Measurement errors are discussed in R. Imai, "Nuclear Safeguards," Adelphi Papers No. 86.

4. See especially, U.S. Congress, Office of Technology Assessment, op. cit.; U.S. Congressional Research Service, Nuclear Weapons Proliferation and the International Atomic Energy Agency, report prepared for the Senate Committee on Government Operations, 1976; U.S. General Accounting Office, Assessment of U.S. and International Controls over the Peaceful Uses of Nuclear Energy, Document ID-76-60, September 14, 1976.

5. Thomas L. Brewer, "Nuclear Energy Forecasts and the International Safeguards System," Technological Forecasting and Social Change Vol. 11 (1977): -

6. Safeguards are scheduled to be implemented in the U.S. and U.K. within a year or so (though all military-related facilities and materials will of course be excluded!).

7. The problems associated with safeguarding enrichment and reprocessing facilities are discussed in Ryukichi Imai, "Safeguards Against Diversion of Nuclear Material," The Annals No. 430 (March 1977): 58-69; and John Maddox," Prospects for Nuclear Proliferation," Adelphi Papers No. 113 (1975).

8. For a discussion of this issue, see the statement of Thomas Halsted in U.S. Congress, House, Subcommittee on International Organizations, Foreign Assistance Legislation for Fiscal Year 1978, part 4, April 1 and 5, 1977, pp. 13-14.

9. Clarence D. Long, "Nuclear Proliferation: Can Congress Act in Time?," International Security Vol. 1, No. 4 (Spring 1977): 52-76.

10. Lawrence Scheinman, "The International Atomic Energy Agency," in Robert W. Cox and Harold K. Jacobson (eds.), Anatomy of Influence (New Haven: Yale University Press, 1973).

11. Information supplied by the Department of State in US. Congress, House, Committee on Appropriations, Departments of State, Justice, and Commerce, The Judiciary, and Related Agencies Appropriations for 1978, part 2, 1977, p. 872.

12. U.S. funding of the IAEA is discussed in U.S. General Accounting Office, Alternative Methods for Funding U.S. Support of International Atomic Energy Agency Activities, Document ID-77-20, May 5, 1977.

13. The Secretariat is divided into five departments. Together with the Office of the Director General, the Department of Administration provides administrative and support services. There are separate departments for the safeguards and technical assistance programs. The two other departments are responsible for the safety and environmental protection program, a marine laboratory at Monaco, laboratory support for the safeguards program, plus several developmental-promotional programs. The latter include peaceful explosions, agricultural applications, theoretical research projects, information distribution, and others. The five departments and their component divisions develop tentative budget requests, which are reviewed by a Budget Committee consisting of the heads of the five departments. This committee's recommendations are submitted to the Director General, who submits the final secretariat recommendation to the agency's "policymaking organs" for their approval.

14. Interviews. See also Scheinman, op. cit.

15. The committee makes recommendations (which are typically accepted) to the full Board of Governors, whose 34 members approve the budget on behalf of the member states. The Board of Governors recommendation to the General Conference (all 110 member states) can only be accepted or rejected by the latter; it cannot be modified. If it is rejected, it must be resubmitted in modified form by the Board of Governors to the General Conference for its approval. In fact, the General Conference has always accepted the Board's recommendations.

16. Scheinman, op. cit.

17. Because of the differential impacts of exchange rates on international organizations' budgets, any comparisons of budget growth rates among them are necessarily only very rough approximations.

18. Some recent (critical) observations about international organizations' budget growth ignore such complications. See, for example, U.S. Congress, Senate Committee on Governmental Affairs, U.S. Participation in International Organizations, 95th Congress, 1st session, 1977.

19. The product moment correlation (r) between IAEA real budget changes and real changes in world gross domestic product is -.51 (or -.59 if a one-year lag is used) indicating a moderate inverse relationship. These and other patterns and trends in the IAEA budget are subjected to more extensive and formalized statistical analysis in the context of a test of the "incremental" model of budgeting in Thomas L. Brewer, "Politics, Economics, and Technology in Budgeting," in progress.

20. Scheinman, op. cit., and Thomas L. Brewer, "The International Atomic Energy Agency," Armed Forces and Society Vol. 4, No. 2 (Winter 1978).

21. The US, UK and USSR are strong supporters of mandatory full fuel cycle safeguards, while FRG and France oppose them. See Bernard D. Nossiter, "Paris, Bonn Said to Resist Nuclear Controls," Washington Post, October 4, 1977, p. A20.

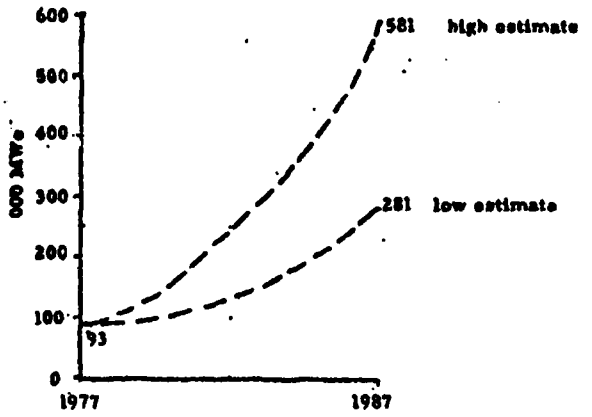
22. For a discussion of transnational and transgovernmental relations, see Robert O. Keohane and Joseph S. Nye, Jr., "Transnational Relations and World Politics: A Conclusion," International Organization Vol. XXV, No. 3 (Summer 1971): 721-748; and Robert O. Keohane and Joseph S. Nye, Power and Interdependence (Boston: Little, Brown, 1977), pp. 25 and 33-35. For a discussion of transnational relations in nuclear energy in particular, see Lawrence Scheinman, "Security and a Transnational System;" International Organization Vol. XXV, No. 3 (Summer 1971): 626-649. Early conflicts over budgeting, and other matters, in the IAEA are discussed in John Stoessinger, "The International Atomic Energy Agency," International Organization Vol. XIII, No. 3 (summer 1959): 394-411.

23. Interviews.

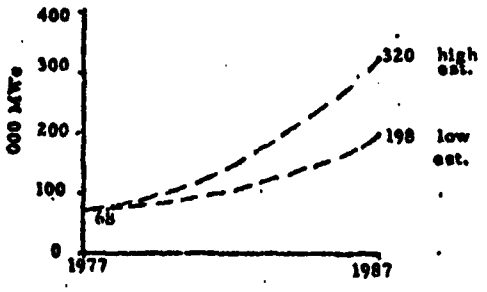
24. Benjamin Sanders and Rudolph Rometsch, "Safeguards against Use of Nuclear Material for Weapons," Nuclear Engineering International Vol. 20, N . 234 (September 1975). Also see Douglas E. George and Ralph F. Lumb, "International Safeguards," Mason Willrich (ed.), Civil Nuclear Power and International Security (New York: Praeger, 1971).

25. Jonathan Sanford and Margaret Goodman, "Congressional Oversight and the Multilateral Development Banks," International Organization Vol. 29, No. 4 (Autumn 1975): 1055-1064.

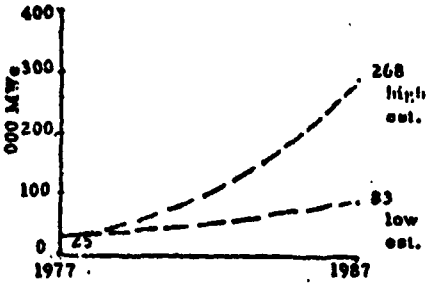
Figure 1. Forecasts of Nuclear Power Plant Capacities



A. All Countries



B. Current Nuclear Weapon Countries



C. Current Non-Nuclear Weapon Countries

Sources: Derived by the author from data in Atomic Industrial Forum, Electricity from Nuclear Power (Washington, D.C., 1977) and Nuclear Power Plants Outside the U.S.: March 31, 1977 (Washington, D.C., 1977). Estimate assumptions and labels are the author's. See discussion in paper for details.

Table 1. Recent Assessed and Voluntary Contributions to the IAEA

Contributing Country	US $ Millions Assessed[a] (1977)	Voluntary[b] (1976)
Australia	0.6	-[b]
Canada	1.2	-[b]
France	2.3	0.1
Germany, Federal Republic	2.8	0.4
Italy	1.4	-[b]
Japan	2.8	0.4
Sweden	0.5	-[b]
USSR	5.9	1.0
UK	2.1	0.3
US	10.3	1.4
99 additional countries	less than 0.5 each	
53 additional countries		less than 0.1 each
Total	37.0	4.8

[a]Only countries contributing over $500,000 are included.

[b]Only countries contributing over $100,000 are included.

Sources: U.S. General Accounting Office, Alternative Methods for Funding U.S. Support of International Atomic Energy Agency Activities, May 5, 1977, Appendix III; U.S. Congress, House, Subcommittee on International Organizations, Foreign Assistance Legislation for Fiscal Year 1978, part 4, 95th Congress, 1st session, April, 1977, Appendix, Table 4.

Table 2. IAEA Estimated 1977 Revenues

	$ US thousands		Percent
Regular Budget		43,501	76
Assessed Contributions	37,000		65
Transfer from prev. yr.; misc.	6,501		11
Operational Budget		7,505	13
Voluntary Contributions	6,000		10
Other	1,505		3
UN Organizations		5,363	9
UN Development Program	4,200		7
UN Environment Program	483		1
Food and Agriculture Organization	680		1
Special Contributions		939	2
Swedish International Development Authority	500		1
Federal Republic of Germany	315		1
United States	84		-
Soviet Union	10		-
Several contributions for study of regional fuel cycle centers	30		-
TOTAL		57,308	100

Source: International Atomic Energy Agency, The Agency's Programme and Budget for 1977-82 and Budget for 1977, Table 5.

Table 3. Recent Budget Growth In IAEA

And Other International Organizations

Organization	FY 1975 (US $ Millions)	Percent Increase 1970 to 1975[a]
International Atomic Energy Agency	28[b]	120
International Monetary Fund	6334	111
International Bank for Reconstruction and Development	6108	166
Inter-American Development Bank	1065	65
Asian Development Bank	570	132
UN Development Program	421	74
World Food Program	300	130
World Health Organization	157	120
UN Relief and Works Agency for Palestinian Refugees	107	166
UN Children's Fund	70	72
Food and Agriculture Organization	69	130
UN Fund for Population Activities	63	690
UN High Commissioner for Refugees	63	942
International Labor Organization	47	70
Organization for Economic Cooperation and Development	34	88
Pan American Health Organization	28	90
International Civil Aviation Organization	19	58
UN Environment Program	17	-[c]
Intergovernmental Committee for European Migration	17	-13
Four Major Financial IO's - Subtotal	14,076	128
Sixty-One Other IO's - Subtotal	1,605	114
Sixty-Five IO's - Total	15,682	126

Table 3 continued

[a]Increases are based on "current" dollars; they therefore reflect price and exchange rate changes as well as program increases.

[b]Regular Budget only.

[c]Created after 1970

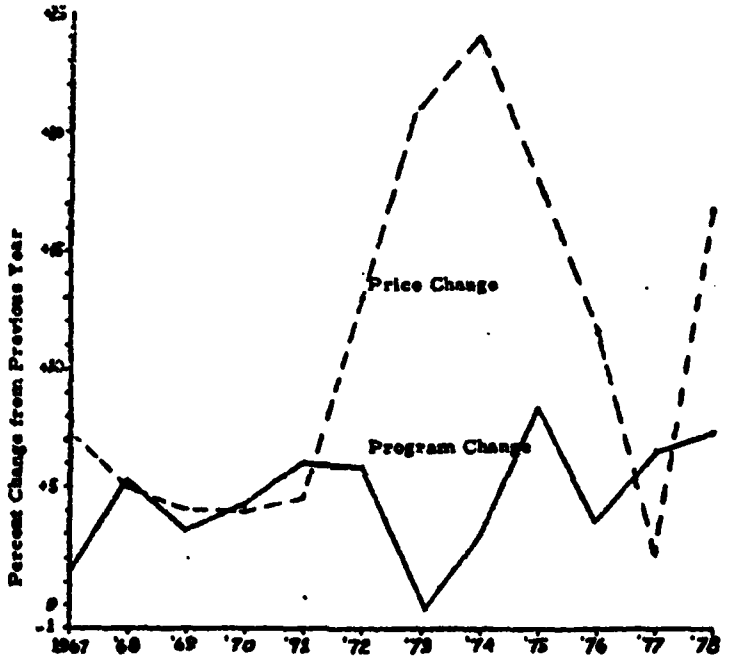
Source: U.S. Congress, Senate, Committee on Governmental Affairs, U.S. Participation in International Organizations, 95th Congress, 1st session, 1977, Appendix 5. Figures have been rounded from the original source.

Table 4. Recent IAEA Budget Changes in Constant Dollar Terms Compared with Changes in US Government Outlays and World Gross Domestic Product

	Change from 1970 to 1975		
	Current Dollar Percent Increase	Constant Dollar Percent Increase	
	Total Increase	Total Increase	Average Per Year
IAEA Regular Budget	120	34	6.8
US Federal Government Outlays	66	14	2.8
World Gross Domestic Product	91	18	3.6

Sources: International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1970-1975); U.S., The Budget of the U.S. Government; U.S., International Economic Report of the President, January, 1977, p. 138.

Figure 2. Annual Program and Price Changes in the IAEA's Regular Budget 1967-1978[a]

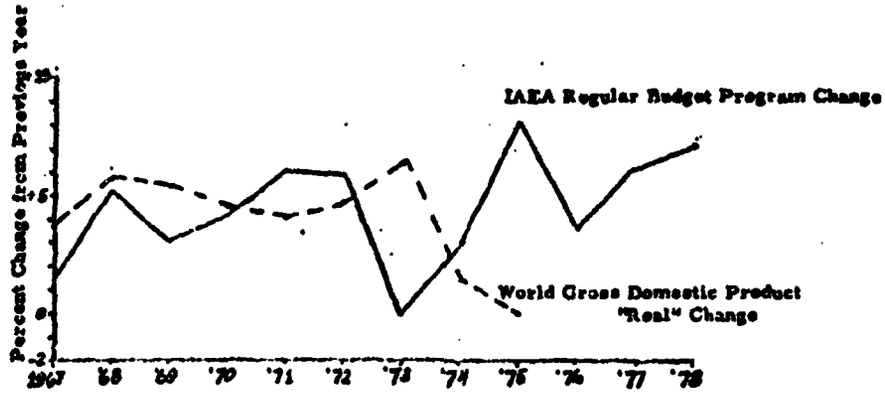


[a] Expenditures for the transfer of the Agency's headquarters are excluded in 1977 and 1978 since these are extraordinary, non-recurrent items.

Sources: International Atomic Energy Agency, The Agency's Program and Budget and The Agency's Budget (1967-1978). The 1978 figures are based on the modified budget in Document GC (XXI)/582/Mod.1 (26 September 1977).

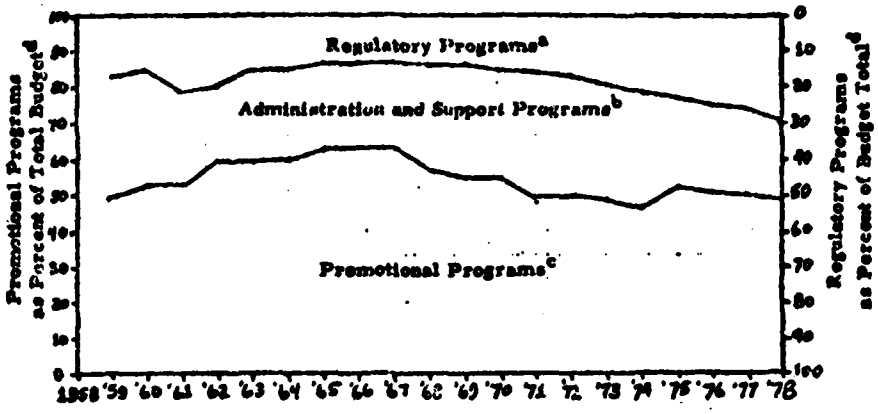
Figure 3. Program Changes in the IAEA's Regular Budget

and "Real" Changes in the World Economy



Sources: International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1967-1978). The 1978 figures are based on the modified budget in Document GC (XXI)/582/Mod.1 (26 September 1977); U.S. Central Intelligence Agency, Handbook of Economic Statistics, 1975 edition, p. 29, and 1976 edition, p. 31.

Figure 4. Allocation of Funds Among Promotional, Regulatory, and Administration-Support Programs in Regular and Operational Budgets 1958-1978



[a]Regulatory programs are defined here to include the following budget items: *safeguards*, *safeguards* portion of analytical laboratory, safety and environment, Monaco marine laboratory.

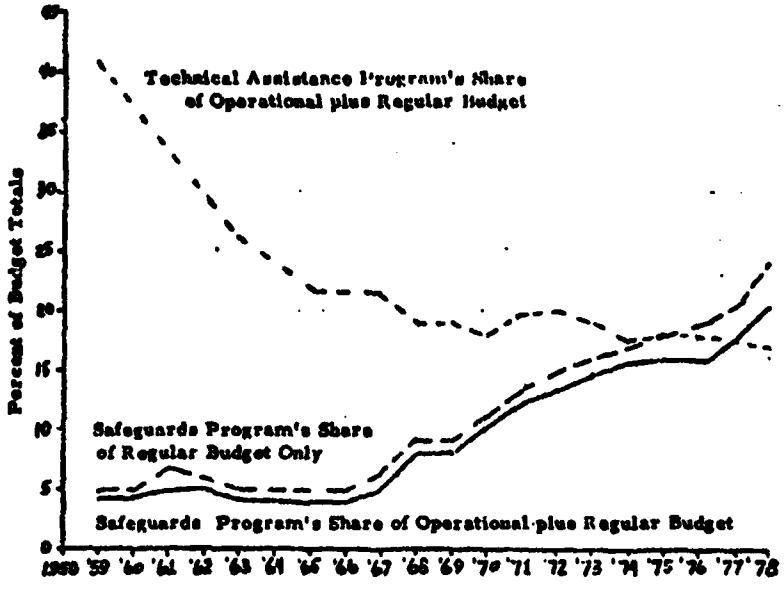
[b]Administration and Support programs are defined here to include the following budget items: policymaking organs, management, administration, general services, service activities. It excludes the costs of transfer to new headquarters.

[c]Promotional programs are defined here to include the following budget items: technical assistance, food and agriculture, life sciences, physical sciences, Trieste Center for Theoretical Physics, power and reactors, scientific information, peaceful explosions, non-safeguards laboratory.

[d]Total is Regular plus Operational Budgets, excluding transfer of headquarters costs. All figures are based on final approved budget estimates, not actual disbursements.

Sources: Derived by the author from data in International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1958-1978). The 1978 data were derived from the modified budget in Document GC(XXII)/582/Mod. 1 (26 September 1977).

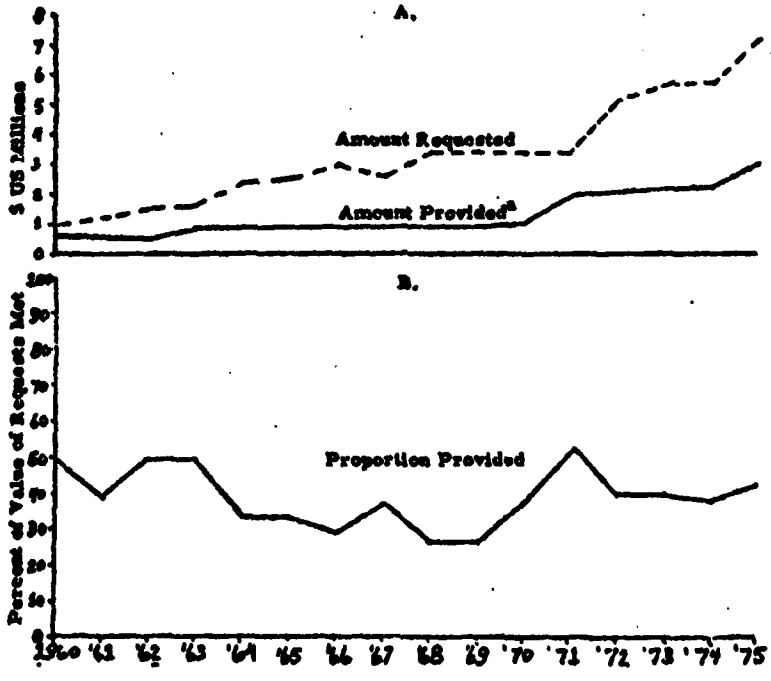
Figure 5. Safeguards and Technical Assistance Programs' Shares of IAEA Budgets[a]



[a]Excludes extra-budgetary financial and in-kind contributions. Figures are based on final approved budget estimates, not actual disbursements.

Sources: Compiled by the author from data in International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1958-1978). The 1978 figures reflect the modified budget in Document GC(XXI)/582/ Mod. 1 (26 September 1977).

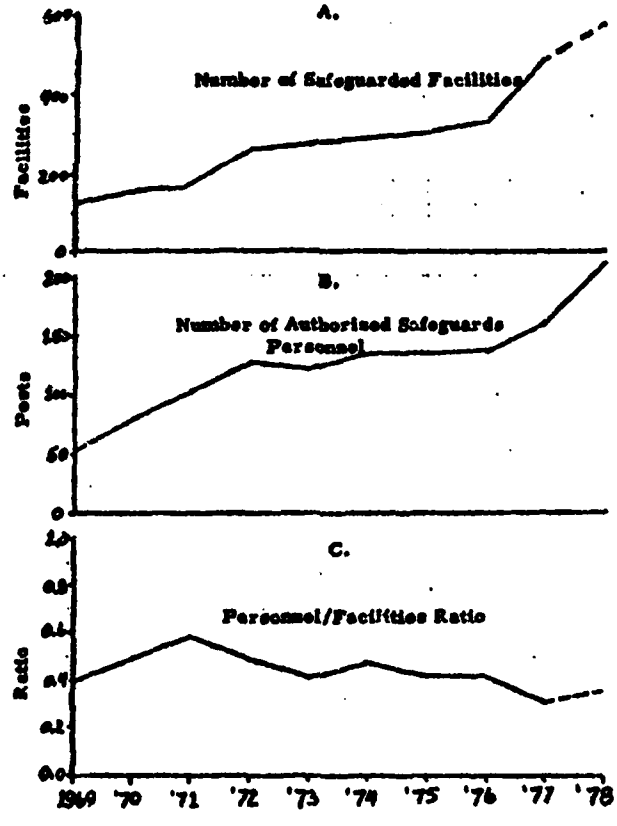
Figure 6. Demands on Technical Assistance Program in Relation to Its Resources



[a]Actual disbursements, not budget estimates.

Sources: International Atomic Energy Agency, Atomic Energy in the Developing Countries, The 1968-69 Programme, Addendum to the Agency's Report to the Economic and Social Council of the United Nations for 1968-69, Document INFCIRC/126/add., p. 12; International Atomic Energy Agency, Annual Report, 1974-75, Document GC(XIX)/544, p. 23.

Figure 7. Demands on Safeguards Program in Relation to Its Resources



Sources: Figures in sections A and B taken from data in International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1969-1978). The 1978 data reflect the modified budget in Document GC(XXI)/582/Mod. 1 (26 September 1977). Data in section C computed by the author.

Table A.1. US Contributions to IAEA Programs

Form and Channel of US Contributions	IAEA Program Supported		
	Safeguards	Technical Assistance	Other
Direct			
Assessed Cash Contribution (State Department)	X	X	X
Voluntary Cash Contribution (AID)		X	
Special Cash Contribution (AI)	X		
In-Kind Contribution (AID/ERDA)	X	X	X
In-Kind Contribution (ACDA)	X		
In-Kind Contribution (NRC)	(X)[a]		(X)[a]
Indirect			
Voluntary Cash Contribution to UN Development Program (AID)		X	
Voluntary Cash Contribution to UN Environment Program (AID)			X
Voluntary/Assessed Cash Contributions to Food and Agriculture Organization (AID)			X

[a]Few thousand dollars

Table A.2. Indirect US Contributions to the IAEA Through Other International Organizations

(US $ thousands)

Indirect Channel	1974 (actual)	1975 (actual)	1976 (actual)	1977 (est.)	1978 (est.)
UNDP to IAEA	3152	3942	3002	3500	4000
US share of UNDP	19%	19%	21%	19%	22%
US to IAEA	599	749	630	665	880
UNEP	69	91	87	527	240
US share of UNEP	32%	21%	31%	35%	40%
US to IAEA	22	19	27	184	96
FAO to IAEA	335	374	451	448	600
US share of FAO	25%	25%	25%	25%	25%
US to IAEA	84	94	113	112	150
IBRD to IAEA	-	-	40	-	-
US share of IBRD	-	-	(33%)[a]	-	-
US to IAEA	-	-	(13)[a]	-	-
Total Indirect US Contribution to IAEA	705	826	783	961	1126

[a]Approximation

Sources: International Atomic Energy Agency, The Agency's Programme and Budget and The Agency's Budget (1975-1978); U.S. Congress, House, Subcommittee on International Organizations, Foreign Assistance Legislation for Fiscal Year 1978, part 4, 95th Congress, 1st session, April, 1977, pp. 93 and 102; U.S. Congress, House Subcommittee on Foreign Operations and Related Agencies of the Committee on Appropriations, Foreign Assistance and Related Agencies Appropriations for 1978, part 2, 95th Congress, 1st session, pp. 991-1084; U.S. Congress, Senate, Committee on Government Operations (Governmental Affairs), U.S. Participation in International Organizations, 95th Congress, 1st session, February, 1977, passim.

Table A.3. Priorities in US Contributions to IAEA

(1977 estimates)

IAEA Programs[a]	US Contribution					
	Direct[b]		Indirect		Total	
	Dollar Amount US $ mil.	Percent	Dollar Amount US $ mil.	Percent	Dollar Amount US $ mil.	Percent
Safeguards	5.6	31	0.0	0	5.6	29
Other Regulatory	0.7	4	0.2[c]	20	0.9	5
Subtotal: Regulatory	6.3	35	0.2	20	6.5	34
Technical Assistance	5.2	28	0.7[d]	70	5.9	31
Other Developmental	3.8	21	0.1[e]	10	3.9	20
Subtotal:Developmental	9.0	49	0.8	80	9.8	51
Subtotal:Administration and Support	3.0	16	0.0	0	3.0	16
Total	18.3		1.0		19.3	

[a]Regulatory programs are defined here to include: safeguards, safeguards portion of analytical laboratory, safety and environment, Monaco marine laboratory. Administration and support programs are: policymaking organs, management, administration, general services, service activities. Development programs are: technical assistance, food and agriculture, life sicences, physical sciences, Trieste Center for Theoretical Physics, power and reactors, scientific information, peaceful explosions, non-safeguards laboratory.

[b]Includes assessed, voluntary, and special contributions (cash; in-kind)

[c]UN Environment Program

[d]UN Development Program

[e]Food and Agriculture Organization

Table A.3 continued

Sources: U.S. General Accounting Office, Alternative Methods for Funding U.S. Support of International Atomic Energy Agency Activities, May 5, 1977; US Congress, House, Subcommittee on International Organizations, Foreign Assistance Legislation for Fiscal Year 1978, part 4, 95th Congress, 1st session, April, 1977, pp.93-102; U.S. Congress, House, Subcommittee on Foreign Operations and Related Agencies of the Committee on Appropriations, Foreign Assistance and Related Agencies Appropriations for 1978, part 2, 95th Congress, 1st session, pp. 991-1084; U.S. Congress, Senate, Committee on Government Operations [Governmental Affairs], U.S. Participation in International Organizations, 95th Congress, 1st session, February, 1977, passim; International Atomic Energy Agency, The Agency's Programme and Budget for 1977-82 and Budget for 1977.