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Report to the Chairman, Committee on Foreign Affairs, House of Representatives

April 1992

ARMS CONTROL

Improved Coordination of Arms Control Research Needed

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National Security and
International Affairs Division

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The Honorable Dante B. Fascell
Chairman, Committee on Foreign Affairs
House of Representatives

Dear Mr. Chairman:

This report addresses the effectiveness of coordination of research being performed to verify arms control agreements.

Unless you publicly announce its contents earlier, we plan no further distribution of this report for 30 days. At that time, we will send copies to the Chairmen, Senate and House Committees on Armed Services and on Appropriations, Senate Committee on Foreign Relations, Senate Committee on Governmental Affairs, and House Committee on Government Operations; the Director of the Office of Management and Budget; the Secretaries of Defense and Energy; and the Director, Arms Control and Disarmament Agency. We will make copies available to others upon request.

If you or your staff have any questions about this report, please call me on (202) 275-4128. Major contributors to this report are listed in appendix IV.

Sincerely yours,

Joseph E. Kelley

Joseph E. Kelley
Director, Security and International
Relations Issues

Executive Summary

Purpose

As the United States and the former Soviet Union reach agreement on numerous arms control treaties, the ability of the United States to develc new technologies to verify treaty compliance will become a critical elem in U.S. national security. The Chairman, House Committee on Foreign Affairs, requested that GAO determine

- how the executive branch decides what research is needed to provide monitoring instruments to on-site inspectors;
- if mechanisms exist to coordinate research and development being done the Departments of Defense and Energy and other agencies to ensure th adequate verification tools will be available to implement existing and future treaties; and
- what the costs will be for on-site inspections to monitor the Intermediate-Range Nuclear Forces Treaty, the Threshold Test Ban Trea the Peaceful Nuclear Explosions Treaty, the Strategic Arms Reduction Treaty, the Conventional Armed Forces in Europe Treaty, and the Chem Weapons Agreement and Convention.

Background

In 1988, the Intermediate-Range Nuclear Forces Treaty between the Sov Union and the United States permitted for the first time intrusive on-site inspections to ensure that both parties were eliminating an entire class o U.S. and Soviet land-based missile systems. In implementing this treaty, U.S. inspectors from the On-Site Inspection Agency used an X-ray device developed by the Departments of Defense and Energy to distinguish between missile types exiting a Soviet missile assembly plant. For many years, the Department of Energy has done research directed at verifying nuclear testing limitations. The Department of Defense has also sponsor research programs directed at nuclear test monitoring. Today, with man arms control agreements pending or being pursued by the administratio both agencies sponsor robust research programs to monitor compliance with treaties ranging from chemical weapons limitations to conventional arms reductions in Europe.

The Arms Control and Disarmament Agency is legislatively mandated to coordinate arms control research. In addition, the National Security Council created the interagency Verification Technology Working Grou provide Congress assurances that arms control research was being coordinated and would provide adequate verification tools for future treaties.

Results in Brief

Defining research requirements in the context of the volatile negotiation process is recognizably difficult, as changes in negotiating positions can render technology under development unnecessary. The Departments of Defense and Energy develop and prioritize research projects independent of each other based on their assessment of what technologies may be used to verify treaties under negotiation or likely to be negotiated. The Arms Control and Disarmament Agency and the Verification and Technology Working Group have not effectively coordinated this research. Although Defense and Energy coordinate informally, they cannot direct each other's programs or assess the potential contribution of research to national arms control objectives. Moreover, neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group has the authority to define requirements or the required funding to direct interagency verification research. Options are available to strengthen the coordination process to ensure more effective use of research dollars; however, agencies' self-interests in funding research will make interagency consensus difficult to reach.

One-time and annual recurring costs to implement and monitor the five arms control treaties and the bilateral chemical weapons agreement will be substantial. However, a number of variables prevent precision in estimating these costs. In March 1991, the Department of Defense estimated that the costs for fiscal year 1991-93 would be about $1.4 billion. GAO's assessment of costs indicates that decisions concerning the scope of verification protocols could significantly change both one-time and recurring costs for several of these treaties.

Principal Findings

Overall Requirements Not Developed Through an Interagency Process

Neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group identifies research requirements or evaluates whether planned or ongoing research projects should be started or continued based on anticipated treaty verification requirements. However, the interagency process offers each agency an opportunity to establish its monitoring requirements as part of the multiyear treaty negotiation process. Agencies establish research and development programs based on negotiated protocol scenarios. The need for a central authority to establish interagency requirements is evident from the results of two Department of Energy seismic verification projects.

In the first case, the Department of Energy began development in 1986 o unmanned seismic stations to be placed in the Soviet Union to monitor compliance with the then-anticipated Threshold Test Ban Treaty. In 198 the Department accelerated this program because it anticipated that unmanned stations would be required within a year. However, unmanned stations were not a U.S. requirement to monitor treaty compliance, and it was highly unlikely that this kind of station would be used. When both countries agreed to manned stations in 1990, the Department of Energy' unmanned stations became unnecessary for treaty monitoring.

In the second case, in January 1990, the Department of Energy began funding research on an in-country station to seismically monitor nuclear tests. The Department of Defense, which the National Security Council designated as the executive agency responsible for monitoring the Threshold Test Ban Treaty, was at the same time reconfiguring existing proven seismic components for manned stations that would be used to monitor nuclear tests in the Soviet Union. GAO found no evidence that the Arms Control and Disarmament Agency or the Verification Technology Working Group had determined whether this simultaneous seismic research was justified, given the relative maturity of seismic technology.

Arms Control Research Coordination Remains Limited

The arms control verification research coordination process has limited impact because neither the Arms Control and Disarmament Agency nor t Verification Technology Working Group sufficiently evaluates existing interagency research efforts or has authority to change research progran of the Departments of Defense and Energy. Although the Agency is legislatively mandated to develop a comprehensive and balanced progran of research, it has insufficient funding to sponsor research programs and not adequately staffed to coordinate the research. The Agency is required by legislation to prepare an annual report to the Congress on completed government agencies' arms control studies but does not assess the justification for planned projects.

The Verification Technology Working Group provides for the exchange o information to coordinate research. The Group discusses reviews of ongoing research efforts in broad terms but does not evaluate or discuss individual projects. The Group did establish one subgroup to coordinate chemical weapons verification research. This subgroup has made progres in coordinating research. For example, it is attempting to prepare a consolidated plan to identify gaps in ongoing research.

Agencies Are Likely to Resist Coordination Options

Because neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group controls funding, gaining cooperation from agencies performing research is difficult. Implementing agencies tend to protect their prerogative to pursue research based on their institutional judgment as to what their contribution might be to the verification process. GAO identified three ways to strengthen the coordination process.

- First, Congress could provide research funds to a lead agency that would be responsible for all verification research. This option would be resisted by implementing agencies whose arms control funding might be reduced.
- Second, Congress could designate the Arms Control and Disarmament Agency and the Department of Defense responsibility to coordinate research. Under this option, the policy community (represented by the Agency) and the likely implementing agency (the Defense Department) would share responsibility for coordination. A major disadvantage of this option is that individual agencies would still control the funding and could continue to do research not sanctioned by this coordinating forum.
- Third, the National Security Council could authorize the Verification Technology Working Group to establish national goals, review and approve all planned research efforts, and designate executive agencies to execute research programs. Executive agencies would likely resist this option because they would be subjected to increased external scrutiny.

Various Factors Will Affect Treaty Verification Costs

GAO's assessment indicates that the final scope of verification protocols could significantly change both one-time and recurring costs for treaty verification. Of the five treaties, the Strategic Arms Reduction Treaty, according to administration estimates, would be the most costly to implement and monitor. A large number of on-site inspections will be required, and designated sites will have to be constructed and continuously monitored. A decision to limit monitoring to a single building rather than to a complex of buildings could halve the budgeted construction costs of $43 million. Similarly, the Department of Defense's cost to verify the Threshold Test Ban Treaty could decrease if the United States decided not to use any one of the three verification measures specified in the treaty protocol. Such a decision may be possible if seismic measurements prove over time to be reliable in determining explosive yields. A factor that will affect multilateral treaties such as the Conventional Armed Forces in Europe Treaty and a Chemical Weapons Convention is the degree of cost sharing agreed to by treaty signatories. The political upheaval in the former Soviet Union and the move by U.S. and Commonwealth leaders to

informally reduce nuclear arsenals is another factor that will affect treaty costs.

Agency Comments

The Departments of Defense and Energy said that their informal arms control research coordination process is effective. (See app. I and II.) Although the Arms Control and Disarmament Agency praised the progres made through informal coordination, it acknowledged that no authoritati mechanism exists to identify requirements and evaluate research in term of its potential contribution to arms control. (See app. III.) GAO believes that the U.S. government needs a focal point to determine if proposed treaties are receiving sufficient emphasis, if other research areas should pursued, or if dual efforts are warranted in specific arms control researcl areas. Moreover, by its nature, informal coordination of research efforts subject to the good will of involved agencies, which are primarily concerned with developing and maintaining their own programs.

Matter for Congressional Consideration

GAO concludes that stronger interagency coordination is needed but provides no specific recommendations. Although a number of alternative are discussed, all of them have disadvantages that the Congress and the administration need to weigh in deciding how to improve coordination. However, a critical improvement to the current process would be the identification of national verification requirements and an interagency pl that prioritizes funding based on established requirements.

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Abbreviations

ACDA	Arms Control and Disarmament Agency
CBO	Congressional Budget Office
DARPA	Defense Advanced Research Projects Agency
DNA	Defense Nuclear Agency
DOD	Department of Defense
DOE	Department of Energy
CFE	Conventional Armed Forces in Europe
CWA	Chemical Weapons Agreement
CWC	Chemical Weapons Convention
INF	Intermediate-Range Nuclear Forces
NATO	North Atlantic Treaty Organization
OSIA	On-site Inspection Agency
PNET	Peaceful Nuclear Explosions Treaty
START	Strategic Arms Reduction Treaty
TTBT	Threshold Test Ban Treaty

Introduction

Pursuing arms control agreements became a foreign policy objective in the nuclear era, and nuclear testing has been limited and monitored for some time. In 1988, the United States and the Soviet Union signed the Intermediate-Range Nuclear Forces (INF) Treaty, which allowed the most comprehensive verification regime, including on-site inspections, in the history of arms control.

Since the INF treaty, the United States and the former Soviet Union have negotiated arms control agreements with much success. Two bilateral agreements signed in the 1970s—the Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET), which limit the yield of nuclear tests and peaceful nuclear explosions—have recently been ratified and are being implemented. Three other agreements have been signed: (1) two bilateral Chemical Weapons Agreements (CWA) between the Soviet Union and the United States, which prohibit the production and limit stockpiles of chemical weapons; (2) the Conventional Armed Forces in Europe (CFE) Treaty, which requires large reductions in the North Atlantic Treaty Organization (NATO) and the former Warsaw Pact countries' nonnuclear arsenals; and (3) the Strategic Arms Reduction Treaty (START), which limits the number of strategic nuclear weapons, their strategic ballistic missiles, and heavy bomber launchers. In addition, a multilateral agreement (the Chemical Weapons Convention (CWC)) with other nations regarding chemical weapons production is being pursued. Verification protocols to these agreements will require on-site inspections as well. Moreover, the United States intends to continue to pursue reductions in strategic weapons and further limit nuclear weapons tests.

Arms Control Verification Involves Many Agencies

Pursuing arms control agreements among nations is a complex process that involves negotiation of agreements, implementation of negotiated treaties and protocols, compliance with agreements, and monitoring and verification of signatory nations' compliance with agreements.

When negotiating arms control agreements, the United States develops protocols that integrate political and military objectives with available or anticipated, acceptable technological means of verifying compliance with the agreements. Key to the development of cooperative verification protocols are four agencies: the Department of Defense (DOD),

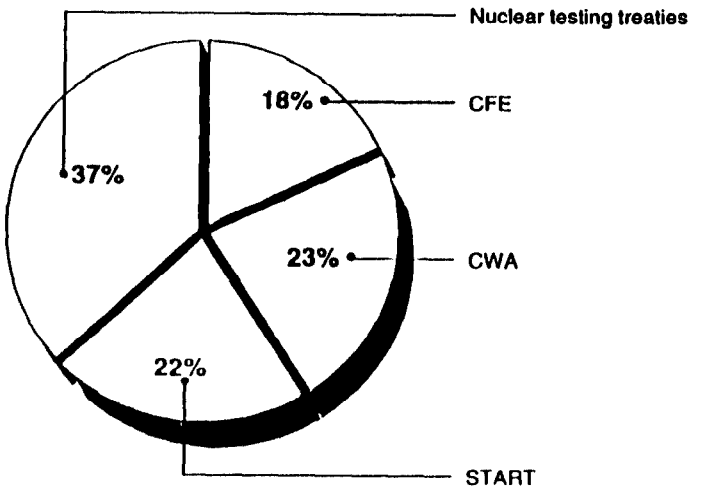
the Department of Energy (DOE), the Department of State, and the Arms Control and Disarmament Agency (ACDA).[1]

DOD plays a large role in the arms control process because (1) the reduction or limitation of weapons largely affects the military services; (2) DOD is responsible for implementing, monitoring, and complying with the agreements; and (3) DOD provides technical expertise to negotiators. DOE, with support from its laboratories, provides technical expertise to negotiators on available or potential technologies for verification. Moreover, DOE must comply with nuclear test limitations. The State Department establishes and maintains diplomatic channels with foreign countries involved in negotiations. ACDA advises the administration on arms control policies, assesses compliance with treaties and agreements, and is required by legislation to coordinate research related to arms control.

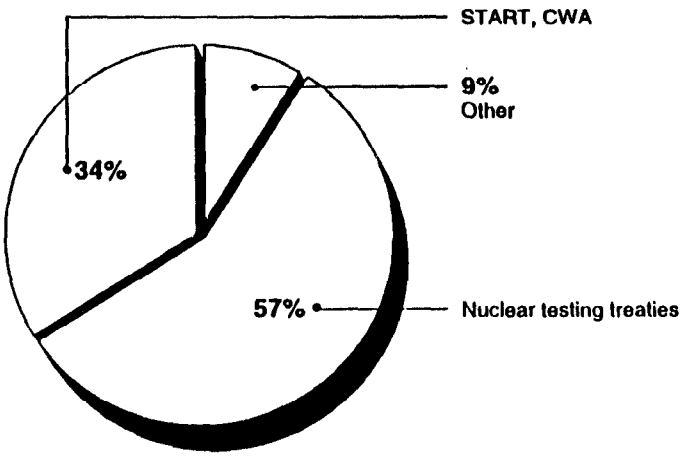
In addition to complying with negotiated treaties, the United States must also monitor and verify the former Soviets' or other signatories' compliance. Prior to the Intermediate-Range Nuclear Forces Treaty, arms control verification was accomplished outside signatories' countries by national technical means. In 1988, the On-Site Inspection Agency (OSIA) was created within DOD to manage on-site inspection of the INF treaty; it will also manage on-site inspections for other treaties as well. As the United States moved to conclude additional arms control agreements, DOD began funding research to support OSIA in 1989. OSIA teams, drawn from military and scientific disciplines, will conduct inspections overseas and will coordinate the activities of Soviet inspectors in the United States. For many years, DOE has supported nuclear test verification and currently devotes over 50 percent of its research to it. (See fig. 1.1.) As a result of DOE's and DOD's technology efforts, the United States was able to monitor the Soviets' compliance with the INF treaty using Cargoscan, which reveals through X-rays if treaty-limited ballistic missiles are leaving Soviet production plants. DOD's Defense Advanced Research Projects Agency (DARPA) has also managed a research program for nuclear test monitoring as does the Defense Nuclear Agency, and ACDA has maintained a small research program directed toward studying arms control issues. Both these agencies' programs have been minimally funded compared to DOE's and DNA's programs.

[1]Several other agencies are involved in implementing arms control agreements. These agencies are discussed in detail in our report Arms Control: Intermediate-Range Nuclear Forces Treaty Implementation (GAO/NSIAD-91-262, Sept. 12, 1991).

Figure 1.1: Fiscal Year 1992 Funding for Arms Control Research



Department of Defense-$102 million



Department of Energy-$140 million

Agencies Roles Are Still Being Defined

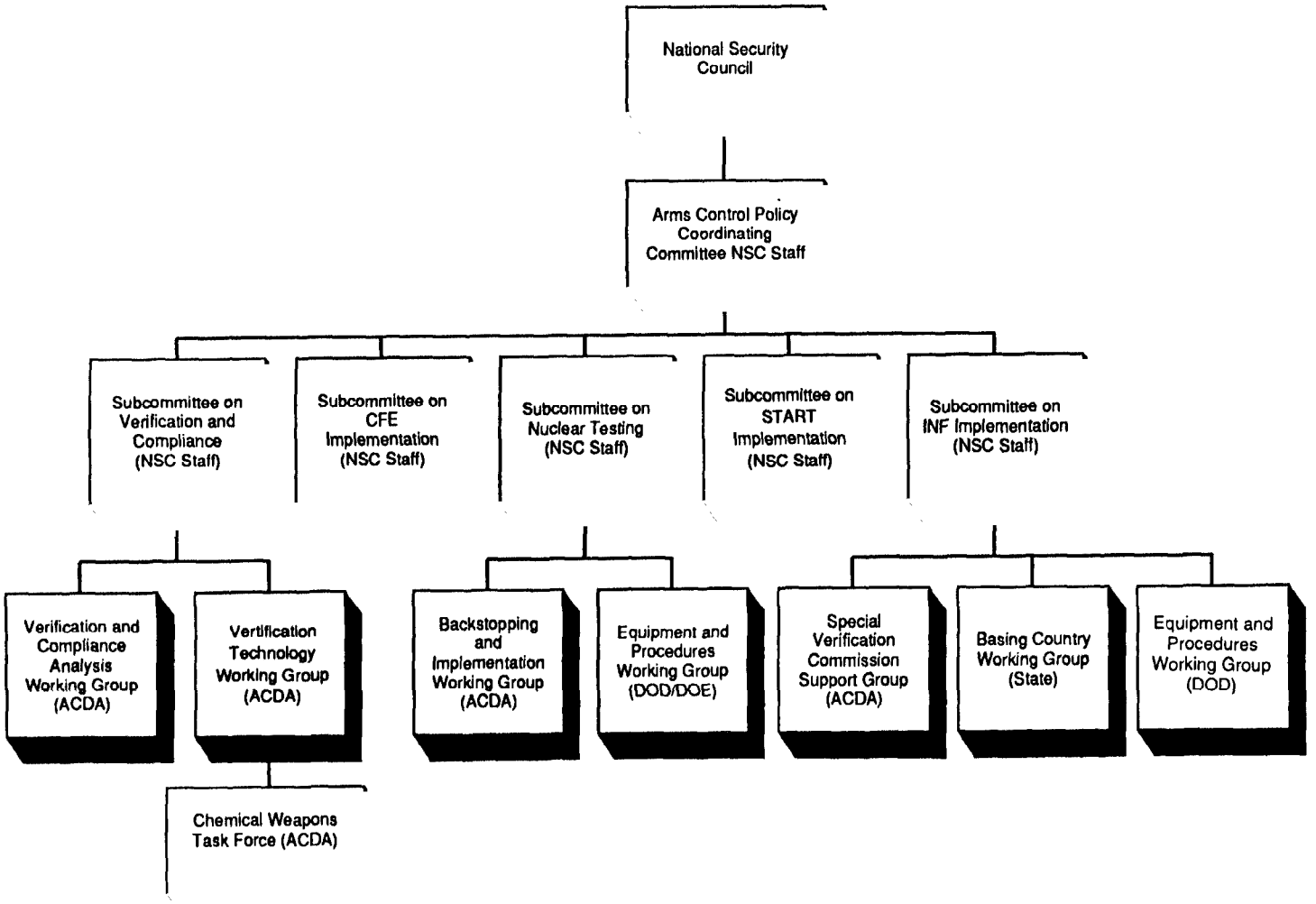
The escalation of arms control negotiations and subsequent requirements for on-site inspections associated with compliance with treaties and agreements have significantly affected foreign policy agencies, DOD, and DOE. Agencies have had to assist in negotiations, comply with treaty terms, verify treaty compliance, and submit to inspections to verify compliance. The number and roles of departments and agencies involved in the arms control process have raised many issues—for example, which agency would oversee on-site inspections, which would perform research and development, and which would pay for verification equipment.

Each administration has developed institutional mechanisms for formulating arms control policy and assigning responsibilities to agencies. Currently, the National Security Council's Policy Coordinating Committee assigns agencies responsibilities for formulating policy, implementing arms control agreements, and developing verification technologies. The Committee has established subcommittees and working groups to address specific treaty-related arms control issues. (See fig. 1.2.) Subcommittees have been established for each treaty and are chaired by cognizant agencies. These subcommittees make recommendations to the Committee, which attempts to provide policy direction and resolve issues among the agencies. The Subcommittee on Verification and Compliance is responsible for matters related to the Soviets' compliance with arms control treaties.

Under the Subcommittee, the Verification and Technology Working Group has established a task force on chemical weapons research to coordinate ongoing research.

As treaty negotiations near completion, the National Security Council issues directives assigning agencies responsibilities for various aspects of treaty implementation. For example, the Council made OSIA responsible for the management of monitoring nuclear testing treaties and directed that OSIA plan to monitor future treaties as well. In November 1990, the Council again clarified agency roles when it established two working groups: the Backstopping Group, which is chaired by ACDA and is to plan to implement the TTBT and PNET; and the Equipment and Procedures Working Group, which is co-chaired by DOD and DOE and is to approve equipment for monitoring Soviet nuclear explosions.

Figure 1.2: Arms Control Policy Process



Congressional Concerns About Arms Control Research

Following the implementation of the INF treaty in 1988, Congress became increasingly concerned about the U.S. ability to provide verification tools for future treaties. At that time, DOE conducted most of the arms control research, and DOD had not yet established a research and development program supporting on-site inspections. To alleviate its concerns, Congress expanded DOE's role in developing arms control verification technology and increased its funding.

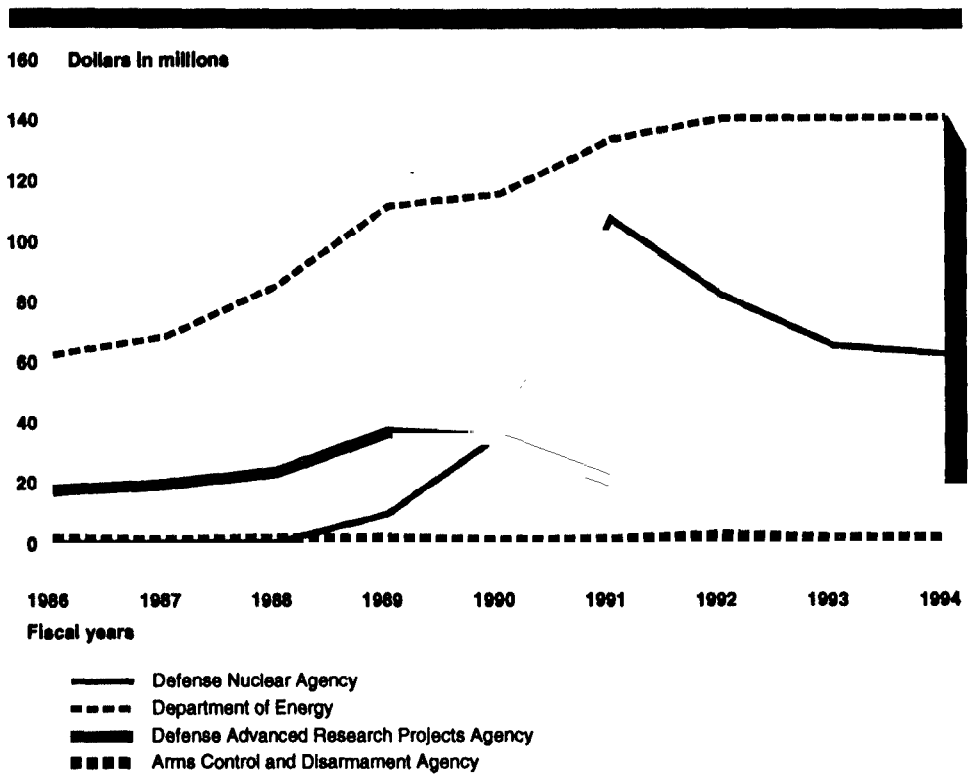
In fiscal year 1989, Congress recommended that DOE's national laboratories establish a systematic program to develop arms control technology to verify potential treaties. The next year, Congress emphasized DOE's authority to conduct "research and development of technologies with application to the verification of arms control agreements." Since 1988, Congress has increased DOE's verification research from the administration's request. These increases amounted to $15 million more than the $139.6 million requested in 1989, $16.2 million more than the $149.6 million requested in 1990, and $22 million more than the $174 million requested in 1991. In increasing fiscal year 1991 funding, the House Committee on Armed Services cited concern "that arms control verification research efforts are not adequately funded in light of the prospect for future treaties significantly reducing both strategic and tactical nuclear weapons." In response to this direction, DOE expanded its research program. For fiscal year 1992, the administration proposed $235 million dollars, an increase of $38.6 million over last year's request. Congress supported $33.6 million of this request.

Congressional staff told us that as the need to be able to verify anticipated arms control agreements became apparent, DOE's research efforts received emphasis primarily because there was a lack of confidence in DODs commitment to arms control.[2] However, since the establishment of OSIA, DOD has established a research program to support on-site inspections for existing and future treaties. In addition, in 1989, the Office of the Secretary of Defense designated the Defense Nuclear Agency (DNA) responsible for research and development supporting on-site inspections. DNA's funding for arms control technology has grown dramatically, from $9 million in fiscal year 1989 to an estimated $107 million in fiscal year 1991. Congress has also funded DOE's research efforts. In 1989, Congress directed DOD to develop a plan to verify a chemical weapons agreement and appropriated $15 million for the project. In the same year, Congress increased DOD's requested $24 million nuclear monitoring research budget by 40 percent. DOD's seismic research is managed by DARPA.

In fiscal year 1992, DOD and DOE are funding verification technology research for approximately $242 million. Figure 1.3 shows the 1986-94 funding for DOD, DOE, and ACDA, which spends a modest $2 million annually for its research program.

[2]DOD has had a long-standing research program to support nuclear test monitoring.

Figure 1.3: Funding History for Arms Control Verification Research



Note: The Defense Nuclear Agency executes DOD's research program to develop on-site inspection hardware. DARPA conducts seismic research.

The Administration Responds to Congressional Concerns Over Research Efforts

Although Congress emphasized and funded DOD's and DOE's research efforts, it wanted assurance that the interagency process could provide monitoring technology to verify future treaties. In 1988, Congress mandated that the administration, using its experience with INF treaty implementation, identify organizational responsibilities among agencies involved in the arms control process. Congress also wanted the administration to identify, by June 1989, efforts to ensure that research and development would meet verification needs.

In March 1990, the administration responded to Congress "that individual departments and agencies have created intra-agency entities and groups charged with consideration...of planning and direction of research and development of technology" to support verification requirements. Within DOD, the Verification Technology Research and Development Working Group is tasked to initiate a long-term research program for verification technologies supporting on-site inspection in a program executed by DNA.

DOE's Office of Arms Control coordinates its national laboratories' research and participates in DOD's formal working group. Agencies believe that this informal coordination is effective. Before delivering the report, the National Security Council, on January 2, 1990, created the Verification Technology Working Group. Members include the Office of the Secretary of Defense and the Joint Chiefs of Staff within the Department of Defense, the Departments of Energy and State, and the Arms Control and Disarmament Agency. This formal group is to coordinate cooperative and other research. In chapter 2 we discuss the effectiveness of these coordinators.

Interagency deliberations among the Departments of Defense, Energy, and State and the Arms Control Disarmament Agency continued in an effort to define agencies' roles in implementing and verifying treaties. In an October 1990 draft paper, the agencies concluded that "interagency planning for implementation needs to begin before signature of a treaty," but they could not agree on the assignment of responsibilities.

Objectives, Scope, and Methodology

The Chairman, House Committee on Foreign Affairs, asked us to determine

- how the executive branch decides what research is needed to provide verification instruments to on-site inspectors,
- if the mechanisms exist for coordinating research and development to ensure that adequate verification tools will be available to implement existing and future treaties, and
- what the costs of expanded verification requirements for on-site inspection will be.

We interviewed officials and reviewed records at the Offices of the Secretary of Defense for Policy and for Acquisition, which are responsible for planning the implementation of the nuclear testing treaties, START, CFE, and chemical weapons agreements.

To obtain information on the costs of implementing treaties, we interviewed officials and obtained estimates from DOD's Office of the Comptroller, the Army Deputy Chief of Staff for Operations and Plans, the Army Chemical Demilitarization Program Office, the Navy Strategic Systems Project Office, the Air Force Deputy Chief of Staff for Plans and Operations, the On-Site Inspection Agency, and the Defense Logistics Agency.

To obtain information on ongoing research efforts, we interviewed officials from the Defense Advanced Research Projects Agency; the Defense Nuclear Agency; the Army Chemical Research, Development, and Engineering Center; and the Air Force Technical Applications Center. Within the Department of Energy, we interviewed officials and obtained documentation from the Office of Arms Control's Policy and Technical Analysis Division, the Systems and Technology Division, and the Office of Intelligence. We discussed ongoing research projects with officials from four DOE laboratories: Sandia National Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and the Pacific Northwest Laboratory. We also obtained information from the U.S. Geological Survey. We analyzed ongoing research projects and verified our findings with the help of an outside expert.

We discussed arms control issues with officials at the Arms Control and Disarmament Agency.

The National Security Council did not provide minutes of the Verification Technology Working Group's proceedings, citing executive privilege. Also, we were unable to get a recent study of the U.S. ability to verify nuclear testing treaties. These restrictions limited the scope of our review.

Our review was conducted from September 1990 to August 1991 in accordance with generally accepted government auditing standards.

Coordination of Verification Research

Technology development is a key component of arms control negotiations and verification. Negotiators need to know what is available, and researchers need to know what is acceptable. Ultimately, on-site inspectors need to be provided a reliable means to monitor treaty provisions. Defining research requirements in the context of the volatile negotiation process is recognizably difficult, as changes in negotiating positions can render technology under development unnecessary. For example, both the Departments of Defense and Energy funded substantial research efforts to develop tags to be placed on weapons to monitor their movement for both CFE and START treaty verification. Although unique identifiers were at one time considered for monitoring START, neither treaty subsequently required tagging in its verification protocols. Moreover, the accelerated ratification of anticipated treaties and the subsequent need to field inspection equipment quickly can require a change in emphasis in research programs.

In fiscal year 1991, Congress authorized DOD and DOE $275 million for arms control verification research and development. To date, ACDA and the Verification Technology Working Group have not been effective in coordinating research because they lack the authority and funding to do so. As a result,

- DOD and DOE have taken independent approaches toward verification research and have, in some cases, duplicated research efforts;
- chemical weapons verification requirements are not yet well defined; and
- DOE's Policy and Technical Analysis Division has done policy analyses outside its purview.

Identification of Research Requirements Key to Effective Coordination

Neither ACDA nor the Verification Technology Working Group have identified verification requirements or evaluated existing interagency research efforts. Although ACDA is mandated, with the advice and assistance of affected agencies, to develop a comprehensive and balanced program of research, development, and studies needed for arms control and disarmament,[1] it has a research budget of only $2 million. This funding is insufficient to employ the technical expertise required to develop such a program. ACDA's research budget is minuscule compared to DOD's and DOE's budgets. Moreover, ACDA is not adequately staffed to coordinate the existing research. According to a recent ACDA Inspector General's report,

[1]Executive Order 11044, "Interagency Coordination of Arms Control and Disarmament Matters," dated 1962.

ACDA's limited budget "makes it almost impossible for ACDA to have more than a minor voice in managing and coordinating such research...."

In 1984, ACDA established the Arms Control Research Coordinating Committee to prepare annual reports to the Congress on the arms control studies completed by government agencies. Because ACDA identifies completed studies in its report and does not assess the justification for planned projects, ACDA has little impact on arms control-related research. Moreover, ACDA officials told us that they return to agencies the studies they feel are not related to arms control. If the studies are not further justified by the agencies, they are not included in ACDA's annual report. While ACDA is complying with its mandate to report on arms control-related studies, not reporting on studies being done with arms control research funding hinders congressional review of how this funding is being used and illustrates the need to establish requirements and strengthen the existing coordination process.

Our analysis of ACDA's 1990 report to the Congress shows that DOE completed a number of studies covering nontechnical issues. This finding illustrates the need to review research projects and strengthen requirements. In one case, DOE's Office of Arms Control, Policy and Technical Analysis Division sponsored two studies to address a policy issue outside DOE's apparent mission. In this case the studies addressed the legality of challenge inspections under the Fourth Amendment to the Constitution—"Legal Aspects of Implementing a Global Chemical Weapons Convention Under Domestic Law," prepared in 1989, and "Constitutional Implications of Implementing a Chemical Weapons Convention," issued in April 1990. Constitutionality of treaty implementation would more appropriately be addressed by the National Security Council, the Department of Defense or State, or ACDA. ACDA officials agreed that it is questionable whether DOE should study the legal or political aspects of potential treaties but said that ACDA had no authority to influence other agencies' research.

Two other DOE-funded studies concern issues on nonnuclear weapons: "Some Implications of Conventional Armed Force Reductions in Europe for the Department of Energy," prepared in May 1989 by the Meridian Corporation, and "Future Treaties: A Proposed Framework for Verifying the Reduction of Conventional Armed Forces in Europe," prepared in September 1989 by Argonne National Laboratory. Both studies identified, at best, a limited direct DOE role. The latter study concludes the following:

> The Department of Energy must decide how important its role will be in the CFE negotiations.... At first glance, the DOE stakes in CFE do not appear great; the CFE treaty involves no nuclear weapons, the activity is centered in Europe, direction is provided by and decisions made under the NATO umbrella, and treaty provisions are limited to military equipment, clearly the purview of the Department of Defense.

Newly Established Working Group Has Limited Influence on Research Programs

The Verification Technology Working Group also has no authority to direct research related to arms control. The Group is to strengthen coordination and cooperation in developing and using verification research. The Group discusses reviews of ongoing research efforts in broad terms but does not evaluate or approve individual projects. The Group has established only one subgroup, which is to coordinate chemical weapons verification research. While this subgroup has made progress in coordinating ongoing chemical weapons research efforts among agencies, it has not prepared a consolidated plan to direct verification research. According to one Group member, subgroups for other treaties are not considered necessary because verification requirements have already been defined; however, no interagency plan exists that identifies verification requirements for other treaties. Rather, individual agencies are making independent judgments as to future research efforts.

The two mechanisms in place—ACDA, established by the Congress, and the Verification Technology Working Group, established by the administration, have not been effective in coordinating interagency arms control research. If arms control negotiations increase, the need to exercise control over expanded research efforts will become even more important. Although difficult during the fluctuating treaty negotiation process, identifying research requirements through the interagency process is the first step to effective research coordination.

DOD and DOE Take Independent Approaches to Verification Research

Since DOD implements most arms control treaties and agreements and is responsible for on-site inspections, its research is focused on the near-term objective of providing OSIA with on-site inspection tools. The Department of Energy focuses on both short- and longer-term verification and technology research. One of DOE's long-term research efforts resulted in the development of CORRTEX, which is being used to monitor the Threshold Test Ban Treaty. In addition, like DOD, DOE uses draft treaty texts, in-house analyses, and informal discussions in interagency forums to make its own projections of future verification requirements. DOE uses its laboratories to develop new or improved verification technologies. Although DOE participates in the interagency process, OSIA and ACDA

officials noted that their agencies provide limited input to DOE's research program. DOE officials stated they would welcome greater input from these agencies.

Because the responsibilities and authority of DOD and DOE are not clearly delineated, each agency develops its own research and development program, and this has created a competition between them. In this period of declining defense budgets, both agencies view arms control verification technology development as a means of maintaining robust research and development programs. An ACDA Inspector General report, completed in 1989, noted that

> arms control has achieved a place of such prominence on the national agenda that Presidents, Cabinet secretaries, and other advisors engaged in the business of national security and foreign policy have developed their own staffs of experts devoted to arms control.

The Inspector General concluded that competition for leadership exists within the arms control arena. This competition manifests itself in the conduct of both policy and research and development. A recent DOE policy paper concluded the following:

> At home, budget and economic pressures point to an era of defense budget austerity.... Nuclear weapons requirements, R&D, production, and maintenance, monitoring and verification technology R&D;...as well as day to day operations of the U.S. nuclear weapons complex are all likely to be impacted.

The paper further stated that a major DOE goal was preserving a robust verification technology research and development program. According to DOE officials, part of DOE's research efforts are directed toward maintaining laboratory expertise in technology areas. Because DOE is not the agency responsible for implementing treaties, the success of its research program depends, in part, on its ability to convince the user of the utility of DOE-developed technology.

Seismic Programs Illustrate Risk Associated With Independent Research

The need for a rigorous review process to identify research requirements is illustrated by DOE's accelerated development of the Deployable Seismic Verification System. During the 1980s, both DOE and DOD performed seismic research directed toward monitoring the TTBT. DOE developed the Deployable Seismic Verification System, an unmanned station. At the same time, DOD sponsored research efforts to improve its manned monitoring capability.

In 1986, DOE began to develop unmanned seismic stations to be placed in the Soviet Union to monitor the Threshold Test Ban Treaty, which was expected to be ratified. At that time, the Verification Technology Working Group did not exist, and ACDA was not reviewing proposed research projects. These stations were not portable but were designed to be left unattended and secured. In 1988, DOE decided to accelerate this program because DOE anticipated that unmanned stations would be required to monitor treaty compliance within a year; however, there was no requirement for unmanned stations. In 1990, TTBT protocols provided for the use of lighter-weight, less-secure manned seismic stations instead of unmanned stations in each country. The National Security Council's Equipment and Procedures Working Group selected the DOD-designed station for treaty monitoring. Nonetheless, DOE continued development of the unmanned stations through fiscal year 1991 for a total estimated cost of $24 million.

Since the unmanned stations were not selected for TTBT monitoring, DOE agreed in February 1991 to transfer the equipment to the U.S. Geological Survey for earthquake monitoring abroad. However, this project remains uncertain because the U.S. Geological Survey wants DOE to pay the installation costs ($1 million per station) and maintenance costs. DOE's collection of such information from a foreign location is independent from and not necessary to DOD's monitoring of the TTBT.

In January 1990, after the TTBT protocol called for manned seismic stations, DOE began funding the development of portable in-country seismic stations for use in monitoring the treaty. The Verification Technology Working Group did not review this specific project. Subsequently, in July 1990, the National Security Council made the Department of Defense responsible for monitoring the treaty and providing seismic stations. DOD was able to design, develop, and field—independent of the DOE portable seismic station development—the stations within a year by reconfiguring existing proven components, including part of the DOE-developed unmanned stations.

DOE is continuing to develop seismic stations for monitoring nuclear testing treaties. In a July 9, 1991, program review before the Verification Technology Working Group, DOE discussed continued development of an unmanned deployable seismic verification system (a modification of the existing Deployable Seismic Verification System) for TTBT monitoring. These stations, which are funded at $4 million in fiscal year 1992, are being designed to operate at ranges of 2,000 kilometers. However, the

requirements for an array of seismic stations have not been defined either by the Working Group or the Defense Department. Moreover, we could not determine whether DOE's effort is required, given DOD's current capabilities to monitor the TTBT seismically. Since DOD is responsible for nuclear test monitoring and has an existing network of stations that are currently being upgraded, the DOE project appears questionable. A DOD official said that (1) there is no requirement to monitor a lower-yield threshold; (2) the decision had not been made to develop manned or unmanned stations in the former Soviet Union to detect lower-yield nuclear tests or monitor a possible comprehensive test ban treaty; and (3) if stations were required, they could be obtained commercially. Moreover, the distances between such stations have not been determined. It appears reasonable that DOE should obtain assurances from the implementing agency, the Department of Defense, to justify the research effort before DOE invests research and development funds in this program.

In addition, DARPA and three DOE laboratories have separate ongoing programs designed to improve the processing of seismic data from a worldwide network of seismic stations that would be required to monitor future nuclear test ban treaties. Monitoring such treaties would require collecting, integrating, and processing voluminous data from seismic networks and integrating it with regional geologic and other data.

DARPA has already developed a significant capability to collect, integrate, and process seismic data. Since 1988, DARPA has been improving the hardware and software used in seismic monitoring. The total cost of the improvements when completed in 1993 will be about $19 million. A prototype has been built and is being adapted to meet verification requirements. Congress has provided funding to support this effort.

Because DARPA's program is directed toward improving DOD's capability to monitor nuclear testing treaties and is nearly complete, three DOE projects directed at improving seismic data processing may not be justified. One project, sponsored by Lawrence Livermore National Laboratory, also involves the development of hardware and software to collect and integrate seismic, geologic, and other data to monitor nuclear tests. This project is funded at about $1 million through fiscal year 1991. In addition, Sandia National Laboratory is developing a monitoring system to improve

automated data handling and processing capabilities for future seismic stations.[2] Finally, Los Alamos National Laboratory is funding a $4 million effort to develop a data base management system that integrates Soviet geologic and topographic data into an automated system.[3] Because these agencies' projects are similar, it is not clear that all of them are warranted.

According to ACDA and U.S. Geological Survey officials, seismic technology is state of the art and only a few, but significant, research issues remain, like improving measurements of low yield nuclear explosions and distinguishing nuclear explosions from chemical or mining explosions. Both DOD and DOE are addressing these issues in their research programs. Today, a stringent review process would help to determine whether ongoing programs are required to meet what appear to be limited or undefined future nuclear monitoring requirements. At a minimum, an analysis of future nuclear testing requirements would help to determine if multiagency research efforts are warranted.

Increased Coordination Taking Place in Chemical Research

Both the Departments of Defense and Energy have research programs directed at providing verification tools for the chemical weapons agreements. The National Security Council established a subgroup within the Verification Technology Working Group to coordinate ongoing research on chemical weapons. According to an official in the subgroup, identification of requirements through the interagency process is planned but has not yet been accomplished, and each agency continues to define its own research efforts.

After DOD and DOE had conducted independent surveys to identify chemical weapons verification requirements, they agreed, in July 1990, that DOD would evaluate DOE prototypes developed to detect treaty-limited items. However, DOD will evaluate the prototypes after they have been developed and will have a limited role, if any, in defining DOE's planned research efforts. To date, both DOD, which Congress has directed to develop a chemical weapons compliance plan, and DOE are providing small-sized chemical detectors for potential use by on-site inspectors.

[2]Sandia's projects are funded within an overall seismic technology program, making project funding difficult to determine.

[3]DOE officials told us that they had stopped funding this project.

On the one hand, DOD's initial effort is to determine whether commercially available gas mass spectrometers can detect treaty-specific chemicals. If commercial spectrometers are not suitable, DOD plans to discuss requirements for chemical detectors with the Verification Technology Working Group chemical subgroup and to use private industry or government laboratories, including DOE, to address its requirements. DOE will spend $2.5 million through fiscal year 1993 to develop a new gas mass chromatograph spectrometer. According to DOE officials, these efforts differ because DOE's effort is for non-treaty-specific purposes. DOD is aware of the project, as is the chemical subgroup. A subgroup official endorsed the DOE effort but said that "to fund such efforts totally from an arms control account, on the basis of their possible future contribution to a chemical weapons convention, is inappropriate."

Regarding other ongoing chemical research efforts, a subgroup official was aware of the general areas of technology being pursued by both DOD and DOE but was unaware of some specific projects that may be unnecessary. According to DOD, the subgroup has obtained DOD's cooperation in focusing DOD efforts to define its research program to meet the needs of the arms control community.

Additionally, the subgroup was instrumental in combining various agencies' planned mock chemical inspections. While the subgroup appears to be making progress in coordinating ongoing interagency research, the detailed review of specific projects would be useful. However, without formal authority to make changes, the chemical subgroup is dependent upon interagency cooperation to make a meaningful contribution to the coordination process.

Options for Coordinating Verification Research

Because neither ACDA nor the Verification Technology Working Group controls research funding, successful coordination depends on the ability of the coordinating activity to gain the cooperation of the implementing agencies. The cases we have cited demonstrate that existing mechanisms are not effective. A number of options are available to strengthen the coordination process. However, these options are likely to be resisted by implementing agencies, which may see them as threatening to their arms control research budgets or encroaching on their prerogative to conduct independent research. Nevertheless, given the volatile nature of treaty negotiations and the uncertainty of future requirements, the current interagency process is inadequate.

Three options for strengthening the process of coordinating and reviewing research are to (1) designate a lead agency with approval authority over research programs, (2) designate the Arms Control and Disarmament Agency to be the lead agency for policy and another agency to provide technical evaluation of research, and (3) strengthen the existing Verification Technology Working Group.

Option: Designate a Lead Agency

The advantages and disadvantages of selecting one agency to manage arms control research are shown in table 2.1.

Table 2.1: Establish a Lead Agency to Fund Verification Research Projects

Agency	Advantage	Disadvantage
ACDA	Involved in all negotiations facilitating the coordination of all treaty requirements Represents U.S. policy Has mandated responsibility to coordinate arms control research Permits initiation of research that might not be done by DOD or DOE	As a policy agency, may support only research that responds to arms control policy objectives of the administration Historically unable to get agency cooperation and perceived by DOD/DOE as incapable of fulfilling this role
DOD	Responsible for treaty monitoring and compliance Has technical expertise Has established research capability Manages on-site inspections Competitively solicits research solutions	Unlikely to get interagency cooperation in directing research Weapons development role may conflict with arms control objectives Generally pursues on-site technologies for immediate use but not long-term research
DOE	Has technical expertise Has history of nuclear-related arms control research and development Laboratories have an established capability Has congressional support Adequately funded to fulfill the mission	DOE generally selects its own laboratories rather than commercial or other available sources for research Little operational role in treaty implementation, so tie to the user is missing Unlikely to get interagency cooperation in directing research

The major advantage of this option is that the potential for unnecessary research projects would be reduced because all research would be overseen and funded by a lead agency. As indicated in table 2.1, the major disadvantage of this option is that the agency selected to be the lead is unlikely to gain the cooperation of other agencies that have traditionally made contributions to verification/monitoring research technology. An argument can be made for designating ACDA, DOD, or DOE as the lead agency. ACDA, for example, could ensure that when changes were made to verification protocols during negotiations, corresponding changes in direction would be made in research efforts. In addition, ACDA could direct the research based on its judgment as to what research would be needed for future treaties. DOD has close ties to the military services, which have to comply with the treaties, and to the on-site inspectors. Thus, DOD-directed research efforts would more likely be responsive to user needs. DOE has an established network of nationally recognized laboratories to support research programs. DOE also has a history of performing long-term research that is not limited to the current administration's arms control verification policy. Both DOD and DOE would resist reductions in their arms control funding.

Option for Dual Agency Responsibility

Under the second option, ACDA would represent policy, DOD would represent the treaty implementors, and both would coordinate and approve research. Table 2.2 shows the advantages and disadvantages of this option.

Table 2.2: Designate Two Agencies to Coordinate Research

Agency	Advantage	Disadvantage
ACDA	Represents U.S. policy and is responsible for certifying compliance	DOD and DOE's policy concerns may conflict with ACDA's assessment
DOD	Has expertise in all aspects of arms control and must comply with arms limitations	DOE considers itself uniquely qualified on technical aspects of nuclear weapons and would resist DOD direction
	Dual configuration would reduce agencies' interference in matters not within their purview	Issues between policy and technical community would have to be resolved quickly at National Security Council level.
	Is required to comply with treaties and provide on-site inspection tools	DOD may not support research that conflicts with weapons development and operational capabilities

The major advantage of this option is that the concerns of the policy community, represented by ACDA, and the likely implementing agency, DOD, would be combined. A disadvantage is that the agencies would resist this structure. DOE could be a technical adviser to the two agencies, since it has a limited role in implementing or verifying treaties. The two agencies could coordinate research efforts to ensure that they supported arms control objectives. A more significant disadvantage of this option, however, is that funding for arms control research would still be spread among agencies, which could continue to do research not sanctioned by ACDA and DOD. To address this problem, DOE could be required to annually submit to ACDA and DOD its planned research projects relating to specific treaties. DOD and ACDA could then certify that DOE's research is not duplicative and addresses either short- or long-term requirements. Under this option, DOD and ACDA could also request other agencies to perform research it considers necessary and apply it to future treaties.

Option for Strengthening Existing Interagency Coordination Process

Under its current structure, the Verification Technology Working Group lacks authority to direct research. According to one member, the Group currently receives program briefings without much specificity. An option is to have the National Security Council strengthen the Group's controls by requiring it to identify national research goals in a master plan. The Council could restructure the Group and include the Office of Management and Budget, which oversees agencies' budgets, to provide budget guidance and be cognizant of research program direction.

This Group would establish national verification requirements and bring together a group including scientific experts from government and industry to conduct periodic reviews, at least semiannually, of proposed and ongoing research efforts to support verification of arms control agreements. To be effective, material presented would be specific in detail and ensure that ongoing research is tied to national goals. Moreover, before significant funds are invested in prototypes, the Group would evaluate the contribution the prototype could make to the verification process and approve investments, especially when competing technologies are involved. A lead agency could be designated to monitor and coordinate research projects directed toward specific treaties and technologies.

Under this option, the Group would be expected to direct changes in research if verification protocols eliminated or reduced the need for some ongoing research. The major disadvantages of this alternative are that (1) funding decisions may remain in various agencies, some of which may

not have a direct role in treaty monitoring, and (2) implementing agencies are likely to resist further scrutiny of their research projects.

Agency Comments

The Departments of Defense and Energy said that their informal arms control research coordination process is effective. (See app. I and II.) Although the Arms Control and Disarmament Agency praised the progress made through informal coordination, it acknowledged that no authoritative mechanism exists to identify requirements and evaluate research in terms of its potential contribution to arms control. (See app. III.) While we believe that in the chemical weapons area, agencies have identified necessary technologies to pursue, the U.S. government as a whole is not determining if each treaty-related area is receiving sufficient emphasis, if other areas should be pursued, or if dual efforts are warranted in arms control research.

Matter for Congressional Consideration

GAO is not making any recommendations. Although a number of options are discussed, all of them have disadvantages that the Congress and the administration need to weigh in deciding how to improve coordination. However, a critical improvement to the current process would be the identification of national verification requirements and an interagency plan that prioritizes funding based on these requirements.

Arms Control Implementation and Compliance Costs

One-time and annual recurring costs to implement and verify the Strategic Arms Reduction Treaty, the Threshold Test Ban Treaty, the Peaceful Nuclear Explosions Treaty, the Conventional Armed Forces in Europe Treaty, and the Chemical Weapons Agreement will be substantial. However, a number of variables prevent precision in estimating these costs. Moreover, dramatic worldwide geopolitical events have occurred since the end of this review. The Soviet Union's political structure has dissolved, new governments within the Commonwealth of Independent States are being formed, and the Warsaw Pact has crumbled. Facing a reduced threat and internal economic problems, both the United States and the former Soviet Union have reduced and are continuing to reduce their nuclear arsenals swiftly and without formal treaties. How these events will affect treaty negotiations and implementation and verification costs is difficult to predict.

For example, these events have changed or delayed implementation of existing or anticipated treaties discussed in this chapter. Thus, this chapter includes one-time estimates or projected costs that will continue to change. The Congressional Budget Office (CBO) estimated that one-time costs will range from $645 million to $3 billion and annual recurring costs will range from $190 million to $660 million. Recent events notwithstanding, identifying short-term budget requirements is difficult because estimates must be made before treaties are effected and verification measures are agreed on. Negotiations often result in changes to inspection procedures and delays in implementing agreements. Our analysis of each treaty to determine the assumptions underlying cost estimates shows that verification measures may be modified to significantly reduce or increase expenditures.

CBO Estimates Treaty Costs for Verification and Compliance

CBO estimates that one-time costs for all five treaties should not exceed about $3 billion and annual recurring costs should be no more than about $660 million. This estimate reflects the costs for the treaties as of December 1990. As of June 1991, some of CBO's assumptions had changed due to DOD actions and changes in treaty protocols, and other assumptions had not been confirmed. Nevertheless, CBO's estimate provides the only comprehensive life-cycle costs for these five treaties. A summary of CBO's estimates is in table 3.1.

Table 3.1: 1990 Estimates of Costs to Monitor Compliance and Inspection of Arms Treaties

Dollars in millions

Treaty or agreement	One-time costs	Annual costs
Strategic Arms Reduction Talks	$410 to $1,830	$100 to $390
Conventional Armed Forces in Europe Treaty	105 to 780	25 to 100
Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty	85 to 200	50 to 100
Chemical Weapons Agreement	45 to 220	15 to 70
Total	**$645 to $3,030**	**$190 to $660**

According to CBO, one-time costs would be for destruction of equipment and facilities, restructuring of forces and bases, inspections to verify declarations made in treaties, and construction of facilities for on-site inspection. One-time costs would be incurred over a 5- to 10-year period after the treaty entered into force but would probably be concentrated in the first 2 to 3 years. The wide range of cost estimates reflects uncertainty about factors such as the number and types of inspections, the quantity of equipment to be destroyed, and the extent of reconfiguration of certain military bases.

According to CBO, recurring costs would be incurred for routine inspections, inspections of sites suspected of having equipment in possible violation of a treaty, and continuous monitoring of some sites. As indicated in table 3.1, START would account for more than half of both one-time and recurring costs, largely because of the number of inspections required initially and over the next several years. Moreover, continuous monitoring of designated sites, called portal monitoring, is anticipated to verify compliance with START. CBO estimates cover portal monitoring at about four or five sites, which accounts for the largest portion of recurring costs.

Analysis of DOD 1991-93 Treaty Costs

In March 1991, DOD estimated the fiscal years 1991-93 funding requirements for the five treaties and the INF treaty to be about $1.4 billion. (See table 3.2.)

Table 3.2: DOD Estimates of Costs to Implement Six Treaties

Dollars in millions

	Fiscal year			
Treaty	**1991**	**1992**	**1993**	**Total**
START	$188.7	$227.3	$218.1	**$634.1**
CFE	42.7	57.4	53.0	**153.1**
CWA	38.0	47.6	52.7	**138.3**
INF	110.0	52.3	41.3	**203.6**
TTBT/PNET	107.2	66.7	60.8	**234.7**
Total	**$486.6**	**$451.3**	**$425.9**	**$1,363.8**

The March 1991 estimates for START, CFE, CWA, TTBT, and PNET represent initial and early recurring costs. The estimates for INF include recurring compliance and verification costs.

These estimates were based on the following assumptions:

- START would enter into force in June 1991, and baseline inspections would be completed in fiscal year 1991.[1] Portal monitoring would be continuous, and 50 to 75 on-site inspections would be done annually. Elimination or conversions of some weapons would be required.
- CFE would enter into force in mid-1991. NATO should complete baseline inspections at 800 to 1,500 Warsaw Pact sites in fiscal year 1991 and annual inspections at 100 to 150 sites following the baseline inspections. The United States would be expected to complete about 20 percent of the NATO inspections. Elimination of treaty-limited items would continue for a 6-year period.
- Verification of compliance with the Chemical Weapons Agreement would involve up to 15 inspections by the United States and the Soviet Union beginning in 1992. The agreement mandates that the destruction of chemical weapons will begin no later than December 31, 1992. Inspection is required at up to eight sites in the United States and at an unspecified number of sites in the former Soviet Union. DOD did not include any cost estimates for the multilateral Chemical Weapons Convention, which it predicted would be signed in fiscal year 1993.
- Estimates for nuclear testing treaties included up to six tests per year. DOD recognized that the number of Soviet tests was highly uncertain; however, the United States can conduct a minimum of two test measurements per year. Inspection teams consisting of 35 to 45 people will take

[1]During baseline inspections, which are conducted soon after treaties enter into force, each country reconciles declared inventories of treaty-limited weapons.

hydrodynamic measurements, 23-person teams will do on-site inspections, and three 5-person teams will operate seismic stations.

DOD's assumptions concerning treaty ratification proved to be optimistic. Only DOD's assumptions regarding TTBT, PNET, and INF remained fairly valid. The United States will conduct two tests, and the former Soviet Union is scheduled to conduct one in 1992. CFE, CWA, and START have been deferred, primarily because entry into force has been delayed. CFE, for example, was ratified in December 1991, CWA has yet to be signed, and START has just been submitted for ratification. Nevertheless, DOD's estimates provide a baseline of implementation costs after the treaties are concluded.

Both one-time and recurring costs for a number of these treaties could either increase or decrease depending on the final scope of the verification protocols.

Estimated START Costs Are Significant

START will be the most costly treaty to implement and verify, largely because of the number of on-site inspections required and because designated sites, called portals, will have to be continuously monitored. START costs could increase significantly if defense contractors' operations are disrupted by inspections. Moreover, missile program costs may increase as well. According to a DOD official, to meet the requirements of the treaty, DOD must purchase treaty-limited production items that do not meet military specifications because these off-the-production-line missiles are considered part of the U.S. nuclear inventory. Normally, these missiles are disposed of by the contractor, either sold as scrap or as defense testing or training items, and DOD is not charged for them under the production contract.

Portal monitoring is designed to provide a means to implement inventory tracking of mobile intercontinental ballistic missiles leaving production facilities. CBO estimates that one-time costs for portal monitoring will range between $70 million and $450 million and recurring costs will range between $80 million and $210 million. CBO estimated that four or five sites in the former Soviet Union would be monitored. However, DOD currently estimates that portal monitoring will be done at only one site by each side, in addition to a portal monitored under INF. At the U.S. site, the scope of portal monitoring may include the entire complex or may be restricted to a single building. The option chosen will have a significant impact on cost for construction and recurring portal monitoring. For example, the Air Force

estimates that enclosing the entire U.S. portal complex would initially involve a construction cost of about $43 million compared to about $20 million if one building were enclosed. Currently, the Air Force plans to adopt the lower cost option.

The U.S. policy is to include portal monitoring of a Soviet missile production facility in START protocols; thus, DOD will be required to fund equipment to go to the former Soviet Union and pay for the continuous presence of on-site inspectors. DOD recognizes, however, that no matter which construction option is chosen, the United States will, in turn, monitor only two Soviet production plants, one of which is already monitored under the INF treaty. The former Soviet Union has numerous missile production facilities where treaty-limited missiles could be produced in violation of the treaty. Largely due to the prohibitive cost of portal monitoring, the United States plans to monitor only one Soviet production facility, in addition to the portal being monitored at Votkinsk under INF. Thus, the benefits to be achieved from portal monitoring in terms of monitoring compliance with START appear to be limited.

Not included in START estimates is $62 million DOD is planning to spend in fiscal years 1991-94 on research for destruction of solid rocket motors. Although, large solid rocket motors are found on the Air Force's Minuteman and the Navy's Trident missiles, which are limited by the treaty, the research and development cost related to missile destruction is not included in START because Congress directed DOD to destroy obsolete large rocket motors in an environmentally safe manner. This research is being conducted by each of the military services. The START treaty, which calls for elimination of treaty-specific items, does not necessitate destruction. The Navy, however, has included in its budget request for the fiscal years 1993-95 START program $99 million in estimated construction funding that will be used to build and equip a destruction facility. Since DOD has not determined which service, if any, will construct facilities for solid rocket motor destruction, these costs may not be incurred.

Estimated Costs to Verify Nuclear Testing Treaties Are High

CBO estimated that TTBT and PNET will incur one-time costs of $85 million to $200 million and annual recurring costs of $50 million to $100 million. The one-time costs will probably be incurred by the end of the first year the treaties come into force. The first-year cost for DOE and DOD to implement the two treaties is estimated to be $122 million. DOD estimates that of this sum, $107 million will be needed for each country to conduct verification activities in 1991 (now 1992). DOE estimates it will need $15 million to

monitor these tests. The former Soviet Union and the United States agreed on the number of tests to be conducted and monitored in 1992. Although no nonstandard tests were anticipated, there will be no reductions in fiscal year 1991 (now in 1992) DOD estimates because DOD plans to train personnel in measuring these tests.

Costs for Verifying Nuclear Testing Treaties Could Decline

Our analysis of annual recurring costs indicates that DOD and DOE may be able to significantly reduce their projected annual TTBT verification costs. According to DOD and ACDA officials, reductions are possible if policymakers are confident that seismic measurements of explosive yields of observed Soviet tests will be accurate. These measurements will be taken by three seismic stations at designated Soviet sites and corroborated by other regional and seismic data.

Reductions will depend upon whether CORRTEX, one of three yield measurement methods being used, remains necessary to ensure that the Soviets are complying with treaty provisions and whether training requirements for personnel associated with hydro-plus measurements can be reduced. CORRTEX, which measures the rate at which cable placed close to the explosive device is destroyed, is expensive because it requires extensive excavation, training in taking measurements, and continued research to improve measurements. CORRTEX comprises about 48 percent of the estimated $47 million annual operating costs of verifying TTBT. Of this sum, about $23 million is required annually for CORRTEX measurements and improvements. CORRTEX yield data will be used to calibrate the seismic yields obtained from Soviet tests.

According to DOD officials, if over time CORRTEX measurements and other data prove that seismic data provides reliable measurements, further CORRTEX testing and research would be unnecessary, and significant cost reductions would be possible. The United States could then seismically monitor nuclear tests.

The TTBT treaty protocols provide for the right to use hydro-plus, another hydrodynamic method that uses cable and transducers, to measure nonstandard tests. The estimated cost of hydro-plus is $69 million over the next 3 years, excluding on-site inspection costs. The first-year cost of $30 million is mostly for equipment to monitor nonstandard tests. The $20 million in annual costs is for continuing research, obtaining equipment, and conducting tests to keep personnel trained in measuring such explosions. According to an ACDA official, while hydro-plus is necessary to measure nonstandard tests, it is highly unlikely that the

Soviets will do a nonstandard test in the next 10 years because the pre-test calibration and the excavation required are expensive and the host country pays for both. The official believes that the treaty protocol provision that allows 180 days to prepare to monitor such tests is sufficient to train necessary personnel and could reduce the costs of maintaining a full-time cadre of trained personnel.

CFE Costs Shared Among Treaty Signatories

The CFE treaty will require significant reductions in the number of conventional weapons located on European soil between the Atlantic Ocean and the Ural mountains in the former Soviet Union. NATO and the six members of the former Warsaw Pact will have to destroy weapons in excess of those permitted by the treaty. Specifically, the former Warsaw Pact countries will have to destroy over 34,500 weapons, including tanks, armored combat vehicles, pieces of artillery, and combat aircraft, which represent more than 30 percent of their current arsenal. After excluding weapons once controlled by East Germany, NATO will be required to destroy about 3,700 weapons, or 5 percent of its total arsenal.

The treaty permits extensive inspections of each side's military facilities to ensure compliance with the treaty. Verifying compliance with the treaty will be a complex task. In the first 3-1/2 years of the treaty, thousands of pieces of equipment are to be destroyed or converted to nonmilitary use. Such activities must be authenticated. In the first 4 months alone, following ratification by all 22 signatories, NATO's 16 nations will be entitled to conduct about 150 inspections in the former Soviet Union and about 120 inspections in other central and eastern European states.

DOD estimates that the U.S. cost to implement the CFE treaty over the next 3 years will be $153 million. Over 70 percent of this cost will be for on-site inspections. The United States will perform 52 of the estimated 302 inspections planned by NATO. The estimate may be somewhat inflated, as it includes costs related to force structure reductions not directly resulting from CFE implementation. For example, DOD considered the need to discharge foreign nationals who work on treaty-limited weapons that are to be destroyed. However, DOD force reductions resulting from reduced defense budgets and the reduced threat have already incorporated CFE force structure reductions. Thus, CFE budget requirements can exclude the amount of this reduction.

Chemical Weapons Agreement Cost Is Difficult to Estimate

The cost to implement the bilateral Chemical Weapons Agreement between the United States and the former Soviet Union is estimated at $138.3 million. This cost is divided almost equally between research and development and operations and maintenance accounts (see table 3.3). The agreement bans the production and limits the stockpiles of chemical weapons. It also requires each country to destroy chemical weapons to meet a ceiling of 5,000 agent tons by the year 2002. Initial verification will involve baseline and elimination inspections.

Table 3.3: Chemical Weapons Agreement Budget Summary

Dollars in millions

	Fiscal years			
Account	**1991**	**1992**	**1993**	**Total**
Research and development	$22.0	$22.5	$22.5	**$67.0**
Procurement	0.5	2.5	1.2	**4.2**
Operations/maintenance	15.5	22.6	29.0	**67.1**
Total	**$38.0**	**$47.6**	**$52.7**	**$138.3**

Annual research and development costs will remain constant at about $22 million but along with procurement costs are likely to increase in the outyears, largely because the technical community has not yet identified verification hardware.

Destruction facilities are currently being constructed under the Army's Chemical Demilitarization Program, which the Congress previously mandated to reduce chemical stockpiles. The Army estimates for completing the program by fiscal year 1997 are $6.5 billion. These costs are not included in the estimates in table 3.3.

A multilateral agreement, anticipated in 1992, will extend the terms of the CWA to other signatories. If a Chemical Weapons Convention is agreed to, recurring costs are likely to increase. The costs of verifying compliance with this convention might be several times higher than the costs for the Chemical Weapons Agreement because of the large number of worldwide chemical factories included in the convention. For example, in August 1991, the United States submitted to the Conference on Disarmament estimates for staffing a technical secretariat to implement and monitor a multilateral agreement. Although these estimates are dependent on the organizational structure and verification regimes selected, the study estimated that inspection costs, including the cost of continuous monitoring at chemical weapons destruction sites, would be about

$407 million during the first 3 years of treaty operations. The study did not estimate the U.S. portion of the costs.

Agency Comments

DOD agreed that the planning assumptions used in fiscal year 1991 were no longer valid. Further, DOD recognized that attempts at defining future estimates would be difficult, given the volatility of political events in Europe and the Commonwealth. DOD did not believe that significant economies could be made based on options chosen for implementing treaty protocols because the United States had not historically chosen to relinquish verification rights. However, ACDA officials said that treaty signatories can choose whether to exercise verification rights if selected verification measures give adequate assurance of treaty compliance. DOD correctly asserted that relying on the three designated seismic stations alone would not provide sufficient data to verify the Threshold Test Ban Treaty. We modified the report to reflect DOD's comment.

Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, DC 20301-2600

INTERNATIONAL SECURITY POLICY

In reply refer to:
I-91/41535

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International Affairs Division
US General Accounting Office
Washington, DC 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) Draft Report, "ARMS CONTROL: Improved Coordination of Arms Control Research Needed," dated November 19, 1991 (GAO Code 467364), OSD Case 8896-X. The DoD generally does not concur with the GAO findings.

As a result of the establishment of a number of interagency working groups, appropriate and effective mechanisms are currently in place for the review and coordination of arms control verification technology research and development. The working groups are responsive to the needs and requirements of the policy community, while still providing agencies the ability to conduct the basic research which they believe is warranted. Duplication of effort is minimized, both because of the communication in the verification research and development community and the desire of agencies to use limited research and development funds wisely. Nonetheless, there is always room for improvement, and we take your comments and recommendations in that spirit.

The DoD has identified a number of factual errors in the draft report and is prepared to provide the appropriate corrections to your staff. Specific DoD responses to the GAO findings are attached. Classified portions of the text are in brackets. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

30 DEC 1991

Douglas R. Graham
Deputy Assistant Secretary of Defense
Strategic Defense, Space, and Verification Policy

Attachment

GAO DRAFT REPORT - DATED NOVEMBER 19, 1991
(GAO CODE 467364) OSD CASE 8896-X

" ARMS CONTROL: IMPROVED COORDINATION OF ARMS CONTROL RESEARCH NEEDED"

* * * * *

FINDINGS

FINDING A: Treaty Verification. The GAO reported that, in 1988, the Intermediate Range Nuclear Forces Treaty between the Soviet Union and the United States for the first time permitted intrusive on-site inspections. The GAO found that, in implementing the treaty, U.S. inspectors from the newly created DoD On-Site Inspection Agency use an X-ray device developed by the Department of Energy (Energy). The GAO also discussed (1) the Threshold Test Ban Treaty, (2) the Peaceful Nuclear Explosions Treaty, (3) the Strategic Arms Reduction Treaty, (4) the Conventional Armed Forces in Europe Treaty, and (5) the U.S.-Soviet Chemical Weapons Agreement. In addition, the GAO noted that the Chemical Weapons Convention is being pursued. The GAO found that verification protocols to those agreements will require on-site inspections as well. The GAO noted that, for many years, Energy supported research on verifying nuclear testing limitations, and the DoD also sponsored research programs on nuclear test monitoring. The GAO observed that both agencies sponsor robust research programs to monitor compliance with treaties. In report figure I.1, the GAO shows the DoD and Energy funding for arms control research in FY 1992; and report figure I.3 shows the FY 1986 through FY 1994 funding.

The GAO reported that many agencies are involved in pursuing arms control agreements, including the Departments of Defense, Energy, and State, and the Arms Control and Disarmament Agency. The GAO also reported that agency roles are still being defined. The GAO noted that, currently, the National Security Council Policy Coordinating Committee assigns agencies responsibilities. The GAO also reported that the Arms Control and Disarmament Agency is required, by legislation, to coordinate research related to arms control. The GAO also found that the National Security Council assigned the On-Site Inspection Agency responsibility for monitoring nuclear testing treaties and directed that it plan to monitor future treaties as well. In addition, the GAO noted that the National Security Council created the Verification Technology Working Group to provide the Congress assurances that arms control research was being coordinated and would provide adequate verification tools for future treaties. The GAO also reported that, in response to congressional direction, the Department of Energy expanded its research program to include research

Note: Classified material has been deleted from these comments.

supporting verification of conventional and chemical weapons agreements. In addition, the GAO found that, since 1989, the DoD had established a research program to support treaty monitoring, with the Defense Nuclear Agency responsible for research and development supporting on-site inspections. The GAO observed that, in an October 1990 draft paper, the agencies concluded "that interagency planning for implementation needs to begin before signature of a treaty" but they could not agree on the assignment of responsibilities. (pp. 1-2, pp. 11-25/ GAO Draft Report)

Now on p. 17

DOD RESPONSE: Partially concur. The responsibility of the On-Site Inspection Agency, as assigned by the National Security Council, is to manage on-site inspection and escort responsibilities for Intermediate-Range Nuclear Forces Treaty, the Nuclear Testing Treaties and future treaties.

See comment 1

While it is true that the DoD and the Department of Energy both sponsored research for monitoring, by hydrodynamic means, underground nuclear tests, the research and subsequent technology developed addressed two different monitoring requirements. The Department of Energy developed hydrodynamic methods for standard tests, while the DoD developed them for non-standard tests.

See comment 2

FINDING B: Overall Requirements Not Developed Through An Interagency Process. The GAO reported that defining research requirements in the context of the volatile negotiation process is recognizably difficult, as changes in negotiating positions can render technology under development unnecessary. The GAO also reported that the arms control verification research coordination process has limited impact because neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group evaluate existing interagency research efforts. The GAO observed that, although the Agency is mandated legislatively to develop a comprehensive and balanced program of research, it has insufficient funding to sponsor research programs and is not staffed adequately to coordinate the research. The GAO pointed out that the Arms Control and Disarmament Agency annual report to the Congress on arms control studies completed by Government agencies does not assess the justification for planned projects. The GAO also found that the Arms Control and Disarmament Agency 1990 report to the Congress showed that Energy completed a number of studies covering nontechnical issues: (1) two duplicative studies to address the legality of challenge inspections under the Fourth Amendment to the Constitution and (2) two other studies concerning issues on non-nuclear weapons.

The GAO reported that another coordination mechanism is the Verification Technology Working Group, which is

co-chaired by the Arms Control and Disarmament Agency [and
The GAO
observed that,
but the group discusses reviews of on-going research efforts in broad terms, and individual projects are not evaluated or approved. The GAO found no interagency program exists that identifies requirements for treaties, other than for chemical weapons. The GAO concluded that, as arms control efforts increase, the need to coordinate research will become even more important. The GAO also concluded that neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group identify research requirements or evaluate whether planned or ongoing research projects should be started or continued based on anticipated treaty verification requirements. In addition, the GAO concluded the following:

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and

- Energy has done policy analyses outside its purview. (pp. 4-5, pp. 27-31/ GAO Draft Report)

Now on p. 19.

See comment 3

DOD RESPONSE: Non-concur. The GAO focused on a perceived lack of sufficient impact on the part of the Arms Control and Disarmament Agency and the National Security Council-chartered Verification Technology Working Group on coordination of arms control research and development requirements. The GAO ignored the role of other groups in defining required research and ensuring sufficient lateral coordination of research and development objectives within the arms control community. One example of the former is the Arms Control Policy Coordinating Committee mechanism. This mechanism identifies in broad terms the verification requirements to meet U.S. policy objectives as they relate to particular treaty areas. Agency representatives to that forum identify technologies or equipment existing within their agency, which can meet these requirements. If technologies or equipment do not exist, then those that sponsor technology research determine if and how they might be able to meet the requirement. The latter determination involves coordination across agencies, both informally and through such groups as the Verification Technology Research and Development Working Group within the DoD. The group, which meets monthly, has the participation of all of the major DoD arms control players, and includes, as observers, the Arms Control and Disarmament Agency, the Department of Energy, . The group has drafted a comprehensive Research and Development Master Plan covering detailed DoD execution plans for the FY 1992/ FY 1993 timeframe and defined research and development investment strategies for the longer term. The plan covers

See comment 4

nuclear testing, chemical weapons, strategic and theater nuclear forces, and conventional forces treaty requirements and anticipated future negotiations requirements.

Now on p. 21.

See comment 5

(p. 27/ GAO Draft Report) conflicts with the reference (p. 30/ GAO Draft Report) to the subgroup to the Verification Technology Working Group on Chemical Weapons, which states that the subgroup "has made progress in coordinating on-going chemical weapons research efforts among agencies." Instead, in that reference, the specific complaint is that the subgroup has not produced a consolidated plan. Since detailed planning has occurred within the agencies conducting significant effort in chemical weapons verification, and since the Verification Technology Working Group subgroup has been able to influence the research and development plans of these agencies, the picture more accurately reflects an increasing level of maturity in execution of lateral coordination for chemical weapons. In the case of the DoD program on chemical weapon verification, specific requirements for the program were levied by the Congress, and funds were not released to the DoD until the Congress received, in its words, a plan for a "well-defined and focused program." A specific example of detailed assessment of chemical weapons requirements is the chemical detector utility study executed by the Defense Nuclear Agency under the auspices of the Assistant to the Secretary of Defense (Atomic Energy). The results of that study are being used to define research and development requirements for chemical sensors.

FINDING C: Departments of Defense and Energy Take Independent Approaches to Verification Research. The GAO reported that the Departments of Defense and Energy are funding research in the areas of (1) tagging, (2) seismic measurements, and (3) chemical and radiation detection devices. The GAO found that DoD research is focused on the near-term objective of providing the On-Site Inspection Agency with verification tools; whereas the Department of Energy focuses on both short- and longer-term verification and technology research. The GAO noted that, according to DoD and Arms Control and Disarmament Agency officials, although Energy participates in the interagency process, their agencies provide limited input to the Energy research program.

The GAO observed that the lack of clear-cut guidelines delineating the responsibilities and authority of the DoD and the Department of Energy has created a competition between them; both agencies view arms control verification technology development as a means of maintaining robust research and development programs. The GAO outlined some problems, such as the following:

Seismic Programs Illustrate Risk Associated with Independent Research--The GAO reported that the need for central authority is evident from the results of two Department of Energy seismic verification projects. In the first case, the GAO reported that, in 1988, Energy accelerated development of unmanned seismic stations to be placed in the Soviet Union; [however, at that time U.S. and Soviet negotiators were only considering the placement of manned stations in each country]. The GAO found that, when both countries did agree to manned stations in 1990, the unmanned stations became unnecessary. In the second case the GAO found that, in January 1990, Energy began funding research on an in-country station to monitor seismically nuclear tests. The GAO noted, however, that the DoD, the executive agency responsible for monitoring the Threshold Test Ban Treaty, subsequently designed and developed manned stations that would be used to monitor nuclear tests in the Soviet Union. The GAO found no evidence that the Arms Control and Disarmament Agency or the Verification Technology Working Group had determined whether simultaneous seismic research conducted by the Departments of Defense and Energy was justified, given the relative maturity of seismic technology.

Increased Coordination Taking Place in Chemical Research--The GAO reported that the Verification Technology Working Group established one subgroup to coordinate chemical weapons verification research. The GAO found that, while the subgroup has made progress in coordinating ongoing chemical weapons research, it has not prepared a consolidated plan to direct chemical weapons verification research. The GAO noted that the DoD and the Department of Energy agreed that the DoD would evaluate Energy prototypes developed to detect treaty-limited items. The GAO observed, however, that the DoD will evaluate the prototypes only after they have been developed and will have a limited role in defining the planned research efforts. The GAO found that, on the one hand, the DoD initial effort is to determine whether commercially available gas mass spectrometers can satisfy their requirement, while Energy will spend $2.5 million through FY 1993 to develop a new gas mass spectrometer. The GAO concluded that, while the subgroup appears to be making progress in coordinating ongoing interagency research, detailed review of specific projects would be useful. The GAO further concluded, however, that without formal authority to make changes, the chemical subgroup is dependent upon interagency cooperation to make a meaningful contribution to the coordination process.

In summary, the GAO concluded that the DoD and the

Now on pp. 3-4, pp. 23-25.

Department of Energy have taken independent approaches toward verification research and have, in some cases, duplicated research projects. (pp. 5-6, pp. 31-39/ GAO Draft Report)

See comment 6

DOD RESPONSE: Non-concur. The DoD and the Department of Energy do not necessarily take independent approaches to research and development, rather they simply work different parts of the research and development cycle. The Department of Energy and its laboratories have provided one key source of the fundamental technology base for arms control verification requirements to satisfy U.S. negotiating positions during arms-control negotiations. Examples are the prototypes developed by the Department of Energy for the DoD (1) perimeter and portal continuous monitoring system, (2) radiation detection and imaging equipment, (3) hydrodynamic yield sensors, (4) equipment seals, tamper indicators, and (5) data authentication devices. The DoD has been made responsible for a broader technology base for executing advanced engineering development and procurement of equipment as part of its treaty implementation responsibilities. Therefore, the DoD programs often capitalize on the technology base developed by the Department of Energy, refining the technology for use in the field.

See comment 7

It is not sufficient to look down the list of topical areas for research within the DoD and the Department of Energy programs and then make findings of duplicative effort when the same topics appear on both lists. It is to be expected that would be the case, considering the roles of the agencies and the carefully defined technology handover arrangements executed between them. In addition, each agency must retain the capability to conduct basic research into areas that are not necessarily connected to any existing negotiations requirements, but satisfy broad approved policy requirements. Such research can provide the technical base for development of systems when requirements are identified. National Security Council establishment of working groups, such as the Verification Technology Working Group and the Nuclear Testing Equipment and Procedures Working Group, have eliminated any previous duplicative efforts.

See comment 8

See comment 9

From a DoD perspective, the DoD research and development initiatives often do not result in the fielding of equipment as part of the implementation of treaties. When the requirement for a particular technology disappears, research and development managers are faced with the decision on whether the work should be immediately terminated or brought to a more gradual conclusion. The latter approach is sometimes taken in order to avoid losing the benefits of the previous investment. The costs associated with

intelligently wrapping up a project and putting the information on the shelf for future use represent a small fraction of the total research and development investment in the technology. Furthermore, the technology is then left in a condition where a rapid restart can be executed, if needed, for other arms control applications.

Comments on the specific Department of Energy projects are more appropriately provided by the Department of Energy.

FINDING D: Options for Coordinating Verification Research. The GAO reported that, because neither the Arms Control and Disarmament Agency nor the Verification Technology Working Group controls funding, it is difficult to gain the cooperation of the implementing agencies. The GAO observed that implementing agencies tend to protect their prerogative to pursue research based on their institutional judgment as to what their contribution might be to the verification process. The GAO identified three alternative ways to strengthen the coordination process:

- (U) The GAO indicated that the first option is for the Congress to provide research funds to a lead agency that would be given responsibility for all verification research. The GAO observed, however, that such an alternative will be resisted by the implementing agencies whose arms control funding may be reduced.

- (U) The GAO noted that a second option is to designate the Arms Control and Disarmament Agency and the DoD as having responsibility to coordinate research. The GAO observed that, under the option, the policy community (represented by the Agency) and the likely implementing agency (the DoD) would share responsibility for coordination. The GAO concluded that a major disadvantage of option 2 is that funding for arms control research would still be controlled by individual agencies, which could would permit them to continue to do research not sanctioned by this coordinating forum.

- (U) The GAO observed that a third alternative is to give the Verification Technology Working Group the authority to (1) establish national goals, (2) review and approve all planned research efforts, and (3) designate executive agencies to execute research programs. The GAO concluded that the third alternative also would be likely to be resisted by those executive agencies that would be subjected to increased external scrutiny. (pp. 6-7, pp. 39-45/ GAO Draft Report)

Now on pp. 5 and 29.

DOD RESPONSE: Non-concur. Creation of a research and development czar under one agency would result in investment

See comment 10

tilted toward the negotiating policy positions of that agency. The alternative, and the current Administration approach, is a research and development program that allows for some diversity and creativity in the technical base area, that is informed on policy and the direction of the Administration through the participation of the policy representatives in deliberations on research and development and that emphasizes the importance of lateral coordination between the agencies on research and development objectives and rationale. In that way, duplication of effort can be avoided, while a legitimate competition of ideas can be sustained.

FINDING E: Congressional Budget Office Estimates Treaty Costs for Verification and Compliance. The GAO reported that the Congressional Budget Office estimated that costs for all five treaties will range from $645 million to $3 billion in one-time costs--and from $190 million to $660 million in annual recurring costs. While the Budget Office estimate reflects the costs for the treaties as of December 1990--the GAO noted that, as of June 1991, some of the assumptions had changed due to actions taken by the DoD and changes in treaty protocols and other assumptions had not been confirmed. The GAO, nevertheless, observed that the Congressional Budget Office estimate provides the only comprehensive life-cycle costs for the five treaties. A summary of the estimates is provided in report table 3.1. The GAO noted that, according to the Congressional Budget Office, one-time costs would be incurred over a 5- to 10-year period, after the treaty entered into force--but would probably be concentrated in the first two to three years. The GAO pointed out that the wide range of cost estimates reflects uncertainty about key factors, such as (1) the number and types of inspections, (2) the quantity of equipment to be destroyed, and (3) the extent of reconfiguration of certain military bases. The GAO reported that the Strategic Arms Reduction Treaty would account for more than half of both one-time and recurring costs, largely because of the number of inspections required initially and over the next several years. The GAO noted that the continuous monitoring of designated sites, called portal monitoring, is anticipated to verify compliance with the Strategic Arms Reduction Treaty. The GAO further noted that the Congressional Budget Office estimates cover portal monitoring at about four or five sites, which accounts for the largest portion of recurring costs. (pp. 46-48/ GAO Draft Report)

Now on p. 32.

DOD RESPONSE: Concur. The GAO is correct about the fragility of cost estimates given the rapid pace at which planning assumption have had to change. Many of assumptions referenced in the draft report were accurate when provided by various agencies, but have now changed. That, in turn,

affects cost estimates.

FINDING F: Analysis of DoD 1991-1993 Treaty Costs. The GAO observed that, while one-time and annual recurring costs to implement and verify the five treaties will be substantial, a number of variables prevent precision in estimating those costs. The GAO noted that, in March 1991, the DoD estimated the FY 1991 through FY 1993 funding requirements for the five treaties and the Intermediate-Range Nuclear Forces Treaty to be about $1.4 billion. (see report table 3.2.). The GAO pointed out that the estimates for the Strategic Arms Reduction Treaty, the Conventional Armed Forces in Europe Treaty, the Chemical Weapons Agreement, the Threshold Test Ban Treaty, and the Peaceful Nuclear Explosions Treaty represent initial and early recurring costs, whereas the estimates for the Intermediate Range Nuclear Forces Treaty include recurring compliance and verification costs. The GAO noted that the DoD did not include any cost estimates for the multilateral Chemical Weapon Convention, which it predicted would be signed in FY 1993.

The GAO also observed that the DoD assumptions concerning treaty ratification proved to be optimistic, as the Conventional Armed Forces in Europe, the Chemical Weapons Agreement, and Strategic Arms Reduction Treaty have been deferred, primarily because entry into force has been delayed. The GAO nevertheless observed that the DoD estimates provide a baseline on implementation costs after the treaties are concluded. The GAO assessment indicates that the final scope of verification protocols could significantly change both the one-time and recurring costs for treaty verification.

The GAO pointed out that, of the five treaties it discussed, according to Administration estimates, the Strategic Arms Reduction Treaty would be the most costly treaty to implement and verify (1) because a large number of on-site inspections will be required and (2) because portals will have to be constructed and continuously monitored. The GAO observed that a decision to limit portal monitoring to a single building rather than to an entire complex having numerous buildings could halve budgeted construction costs of $43 million. (The GAO also pointed out the $63 million that is to be spent in FY 1991 through FY 1993 on research on destroying large rocket motors in an environmentally safe manner is not included in the DoD treaty monitoring cost estimate. The GAO further pointed out that the cost of destruction facilities for rocket motors or chemical weapon stocks also is not included.) Similarly, the GAO found that the Department of Defense cost to verify the Nuclear Test Ban Treaty could decrease, if any one of the three verification measurement devices is eliminated. The GAO

noted that elimination may be possible if seismic measurements prove to be reliable in determining explosive yields. Finally, the GAO concluded that a factor that will affect multilateral treaties, such as the Conventional Armed Forces in Europe Treaty and a Chemical Weapons Convention, is the degree of cost sharing agreed to by treaty signatories. (pp. 7-8, pp. 48-59/ GAO Draft Report)

Now on pp. 5 and 34.

See comment 11

DOD RESPONSE: Partially concur. The GAO analysis of the DoD arms control costs, based on planning assumptions provided to Congress in March 1991, is no longer relevant. Revised planning assumptions were provided to the Congress by the DoD in June 1991. The DoD treaty managers have been required to stay abreast of developments in Eurasia that could significantly alter requirements for arms control implementation and, consequently, the research and development program supporting it. It is to be expected that even the June 1991 planning assumptions will need to be modified in recognition of recent arms control initiatives by the President and of fast-breaking events. Since the value of cost estimates decreases rapidly with time in the arms control arena, the GAO should either update its analysis or simply put disclaimers on the validity of the existing analysis, since it does not reflect current conditions.

See comment 12.

The GAO comments to the effect that costs can be significantly driven downward if signatories find that certain verifications rights need not be implemented do not reflect reality. It has not been a recognizable trend in arms control that nations want to relinquish inspection rights. As for the U.S., only meaningful verification rights that are required for effective verification are sought. Therefore it should be recognized that a decision not to exercise those rights would mean the U.S. would not have effective verification. The principal driver for the reduction in treaty implementation costs is the elimination of the objects or events subject to verification.

See comment 13.

The specific GAO comments related to the implementation of the Threshold Test Ban Treaty are not accurate. While seismology is a proven science, there is currently only one calibrated seismic data point for a nuclear test in the Soviet Union. That occurred when the U.S. measured by on-site hydrodynamic means, the yield of a Soviet nuclear test at the Semipalatinsk Test Site and correlated the hydrodynamic yield measurement with seismic data. Seismologists would agree that more data are required to reduce the uncertainty of seismic measurements. In addition, seismic measurements from the three Designated Seismic Stations alone could not provide sufficient data to obtain an accurate seismic yield estimate.

Now on p. 5.

MATTER FOR CONGRESSIONAL CONSIDERATION

SUGGESTION: The GAO observed that, although a number of alternatives are discussed, all of them have disadvantages that the Congress and the administration need to weigh in deciding how to improve coordination. (pp. 8/ GAO Draft Report)

DOD RESPONSE: As stated previously, it is the DoD position that there now exists, among the various agencies, a mechanism for effective coordination on arms-control research issues.

The following are GAO's comments on DOD's letter dated December 30, 1991.

GAO Comments

1. The report was modified to reflect OSIA's management responsibilities.

2. Although we discuss hydrodynamic research in chapter 3, we do not address potential duplication of research done by the Departments of Defense and Energy.

3. We were not given access to the minutes of the National Security Council's Policy Coordinating Committee's Subcommittees to assess their effectiveness in identifying research requirements and coordinating agency research efforts. However, both the Department of Energy and the Arms Control and Disarmament Agency told us that there are no national requirements. In addition, members of the National Security Council's Verification and Technology Working Group told us that they are moving toward establishing requirements but have none as yet. Moreover, as we illustrate, the Department of Energy continued the development of seismic stations to be used to monitor the Threshold Test Ban Treaty even after the National Security Council's Equipment and Procedures Working Group had not selected those stations to monitor the treaty. When we discussed the draft report with members of the Verification Technology Working Group, they were unaware that ongoing seismic research efforts were being performed by both Departments.

4. According to an administration report submitted to the Congress in March 1990, the formal interagency mechanism for coordinating verification research lies within the National Security Council, not within the Department of Defense. DOD submits that its Verification Technology Research and Development Working Group informally works with other agencies to define required research and has drafted a comprehensive plan, yet officials at the Department of Energy maintain that national requirements are nonexistent. DOD denied us access to its draft plan and minutes of its Working Group meetings; therefore, we cannot comment on the effectiveness of lateral coordination as it applies to directing, redirecting, or prioritizing ongoing or planned interagency programs. By its nature, informal coordination of research efforts is subject to the good will of the involved agencies, which are primarily concerned with developing and maintaining their own programs.

5. Our statements that (1) requirements are not defined and (2) the subgroup is making progress do not conflict with each other. We recognized progress the National Security Council's chemical subgroup had made, acknowledging that DOD and the Verification and Technology Working Group subgroup worked together to help define DOD's research program directed toward monitoring, through on-site inspection, a chemical weapons treaty. However, we pointed out that even though the subgroup had been effective in this area, it had not developed, through the interagency process, national requirements to be used by all agencies in developing their programs. Without the establishment of national treaty requirements, both Departments continue to do research on chemical detectors and trace analysis and are developing data bases of chemical agent characteristics, including decomposition. While we believe that the agencies have identified necessary technology areas to pursue, the U.S. government as a whole is not determining if dual efforts are warranted, if each area is receiving sufficient emphasis, or if other areas should be pursued. We believe and the Arms Control and Disarmament Agency agrees (see app. III) that overall requirements are necessary to ensure that all technology areas are addressed, prioritized, and funded appropriately within fiscal constraints.

6. We recognize that in some research areas, the Departments of Defense and Energy have informally divided responsibility for basic research and technology development. However, we believe it would be misleading to imply that the separation covers all verification research. For example, we recognize that the verification technology program executed by the Defense Nuclear Agency is primarily dedicated to providing on-site inspection tools and is therefore analogous to advanced engineering development. However, a portion of DNA's research program, according to DOD planning guidance, is to be dedicated to longer-term basic research efforts. Moreover, as we illustrate, both agencies have produced seismic stations to support nuclear testing treaties.

7. In identifying similar projects, we examined specific project descriptions; discussed projects with their respective managers, who acknowledged similarities in both objectives and approaches; and had the projects evaluated by a technical expert. In addition, the Nuclear Testing Equipment and Procedures Working Group deals with treaty implementation and not treaty-related research.

8. We agree that the development of technologies to monitor existing or future treaties is a national process that involves input from many

agencies. The contributions of agencies to this process is not at issue. The Departments of Defense and Energy at times develop parallel research directed toward the same requirement. The Designated Seismic Verification System and DOD's seismic research were directed toward developing monitoring equipment for the Threshold Test Ban Treaty. Both agencies did basic research and developed prototypes. However, we believe that the interagency process should have reviewed the need to continue the DOE effort when (1) the Soviet Union and the United States planned early on to permit on-site monitoring, which made the unmanned stations unsuitable; (2) the National Security Council designated DOD responsible for seismic monitoring of the treaty; and, (3) the National Security Council's Equipment and Procedures Working Group did not select the Designated Seismic Verification System for treaty monitoring. In commenting on our report, the Arms Control and Disarmament Agency said there was a need to reconcile agency missions to the research efforts they are funding.

9. We recognize that not all technology developments result in the fielding of equipment. We believe that fiscal constraints and good management should dictate that this does not often occur. For example, when changes in negotiating positions render ongoing efforts unnecessary, we believe that the formal interagency review process should provide input as to whether research that is no longer applicable to treaty protocols should be discontinued or completed and shelved for possible future use.

10. We recognize that disadvantages exist in all of the options we identified. We also recognize the contributions made in informal coordination of research between DOD and DOE. However, we have also identified continuing parallel research in the seismic and chemical areas. We believe the value of parallel research efforts, including their funding levels, needs to be addressed in the formal interagency process.

11. We recognize that the cost data in our report is outdated. Estimating costs for future treaties is a continuously changing process due to changes in negotiations. Moreover, since the dissolution of the Soviet Union has made uncertain the ratification time frames of several treaties as well as the nature of future arms control reductions (unilateral or bilateral) and verification regimes, we have not updated the cost section.

12. According to officials at the Arms Control and Disarmament Agency, the U.S. government may forgo some verification rights if it has confidence in the available data with which to make compliance determinations.

13. We identified areas where possible increases or decreases in treaty costs may be affected. We agree with DOD that not enough data currently exists to verify explosive yields based solely on seismic measures from in-country stations. We have clarified the report to reflect that cost savings for monitoring the Threshold Test Ban Treaty may be realized after several years of assessing seismic measures of nuclear tests at designated Soviet sites and corroborating those measures with teleseismic data and other data. DOD and ACDA officials believe and our technical expert agrees that it may then be possible to rely on a combination of in-country and teleseismic stations (stations that are long distances away from nuclear test sites) for treaty verification if the U.S. government is confident that resultant data is sufficient to assess treaty compliance.

Comments From the Department of Energy

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

The Under Secretary of Energy
Washington, DC 20585

January 21, 1992

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International Affairs Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

The Department of Energy (DOE) appreciates the opportunity to review and comment on the General Accounting Office (GAO) draft report entitled, "Arms Control: Improved Coordination of Arms Control Research Needed."

While we recognize the GAO interest in producing a comprehensive report on this complex issue, we are concerned that there are several basic misunderstandings as well as many factual errors in the report.

See comment 1

Traditionally, DOE and its predecessors have been performing arms control verification research and development (R&D) since the early 1960's with the full and active support of the Congress. This active support recently took the form of an amendment to section 91a of the Atomic Energy Act of 1954 which requires a program to: "... carry out research on and development of technologies needed for the effective negotiation and verification of international agreements on control of special nuclear materials and nuclear weapons" (P.L. 101-189, section 3157 enacted November 29, 1989). This legislation provides the latest statement of DOE's authority to perform such R&D.

See comment 2

Even though DOE has independent authority to perform research, we disagree with the assertion in the Report that arms control verification R&D is not coordinated among the Executive Agencies. In fact, we wholeheartedly support the concept of coordinating research activities, and believe that this coordination is being effectively pursued by those organizations involved in arms control research. The Department of Defense (DOD) and DOE work together to avoid duplication in research projects. As an example, when the Defense Nuclear Agency (DNA) requested verification research proposals from the DOE National Laboratories, the DOE's Office of Arms Control (OAC) screened them to insure that only proposals which DOE was not already funding were forwarded. Similarly, we have agreed with DNA that DOE would develop technologies to the field deployable prototype stages, and then, depending on the verification requirements at that time, either turn the project over to DNA or document the project and put it on the shelf. In addition, in order to facilitate interagency research coordination, the OAC has established a data base on DOE arms control projects and made it available to all Government organizations.

See comment 3

We have also continued to encourage R&D end users to participate in our activities at an early stage of development. An example of this is the design of the Deployable Seismic Verification System (DSVS) which was built to the initial requirements of the Air Force Technical Applications Center (AFTAC). Members of AFTAC participated throughout the development lifetime of the DSVS, and AFTAC and DOE are jointly testing the system now. The Defense Advanced Research Projects Agency (DARPA) capability to design, develop, and field seismic systems in one year was the result of DARPA's use of the downhole equipment designed and built for the DOE DSVS. DOE even partially funded this production and transfer of equipment to DARPA, another example of DOE's interest in technology coordination, regardless of politics or turf.

See comment 4

See comment 5

We believe that the report misunderstands the DOE role in technologies associated with National Technical Means (NTM) and On-Site Inspection (OSI). Although there are some technologies applicable to both activities, generally these activities require different technological approaches. For example, there is little resemblance between radiation detectors for satellite instrumentation and the Intermediate Range Nuclear Forces (INF) OSI. Additionally, cooperative OSI means that the technology must be unclassified and releasable to other nations, while technologies for NTM or for covert collection activities are generally highly classified. Therefore, determination of the value of a product must take into account its intended use.

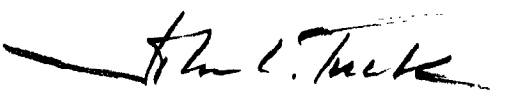
See comment 6

In order to have a quick response capability, a substantial technology base must be maintained. An example of this is production of the radiation detector for the INF Treaty. This was a multilaboratory, interagency (DOE, AFTAC, and OSIA) effort built on the technology base which already existed. Without the strong long-term technology base maintained in major technical disciplines (satellite, seismic, radiation detection, and CORRTEX), DOE would not have been able to respond to this near-term requirement in time for implementing the treaty.

We were pleased to meet with your staff and enjoyed the opportunity to assist them in correcting the factual errors we had identified in the report.

Thank you again for providing the DOE with the opportunity to make comments on this report.

Sincerely,



John C. Tuck

The following are GAO's comments on DOE's letter dated January 21, 1992.

GAO Comments

1. We do not dispute the Department of Energy's authority to do arms control verification research. As DOE noted, Public Law 101-189, section 3157, authorizes the Department to focus on research involving negotiation and verification of the control of "special nuclear materials and nuclear weapons." We believe that DOE has exceeded this mandate in doing policy studies on DOE's role in implementing the Conventional Armed Forces in Europe Treaty.

2. We recognize that informal coordination, such as exchanging data bases and attending meetings, exists among agencies performing arms control research. However, the administration established a formal interagency group, the Verification and Technology Working Group, to coordinate ongoing research, even though both the Departments of Defense and Energy had existing informal coordinating bodies. In establishing the Group, the administration wanted to "formalize and strengthen" coordination. The Group is moving toward, but has not achieved, the identification of arms control verification requirements to support future treaties.

The Department of Energy states that it and DOD have agreed that DOE will develop technologies to the prototype stage. Prototypes not meeting current verification requirements are "put on the shelf." This process is precisely what we have addressed. First, the process excludes the National Security Council's interagency group and the Arms Control and Disarmament Agency. Second, it prevents prioritization of programs in terms of national goals. Third, as in the case of the Designated Seismic Verification System, it permits the continued development of programs even after missions have changed. As we illustrate, no organization has authority over or central control of funding to direct the research programs of others. We also cite areas where both agencies continue to perform seismic research directed toward monitoring not only the TTBT treaty but future treaties as well, even though the administration has given DOD that responsibility. Further, we believe that a formal interagency decision process would better ensure that limited research funds are maximized and could minimize the number of prototypes put "on the shelf."

3. Officials in the Office of the Secretary of Defense said that since the Air Force Technical Applications Center is an operational unit, "they are not appropriate for providing guidance on research goals." Currently, only one

of the five Designated Seismic Verification System prototypes built, which were justified as necessary to monitor the Threshold Test Ban Treaty, is being tested for research purposes by the Air Force. The remaining four prototypes were dismantled, and only one part, the seismometers (which were purchased commercially), has been given to the Air Force. The remaining components are in storage.

4. We modified our report to reflect the use of parts of the Designated Seismic Verification System in DOD-designed seismic stations. According to DOD officials, DOD paid a DOE laboratory $918,800 to modify DOE's downhole equipment and integrate it into the DOD-designed stations that will be used to monitor the Threshold Test Ban Treaty. DOE's transfer of the seismometers and lessons learned appear to constitute DOE's contribution to seismically monitoring the Threshold Test Ban Treaty. DOE expended $24 million on this development.

5. We did not address research being performed for the intelligence community. We did identify a prototype that was not developed solely for cooperative use but was justified for use in arms control verification; however, we removed this example from our report because the information was classified.

6. We agree that U.S. interests would be served by maintaining a long-term technology base. We also believe that maintaining a technology base necessitates supporting some non-treaty-related research. However, research directed toward a specific purpose, like verification of arms control agreements, and done by several agencies could be better managed through the identification of national objectives or requirements, a consensus on funding priorities of research supporting specific treaties and done by agencies with appropriate missions, and a determination during development of its contribution to arms control.

Comments From the Arms Control and Disarmament Agency

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY
Washington, D.C. 20451

December 23, 1991

Dear Mr. Conahan:

Enclosed please find ACDA's comments to the November 1991 GAO Report, "ARMS CONTROL: IMPROVED COORDINATION OF RESEARCH NEEDED". Two types of comments are included, editorial and substantive. We provide the attached substantive comments for inclusion in the report itself. With respect the editorial comments, we would be glad to provide GAO with whatever assistance you might need to ensure that the report is as accurate as possible. Please feel free to contact Dr. Barbara Seiders at (202) 647-4154 if you decide such assistance would be helpful.

Sincerely,

William J. Montgomery
Director of Administration

Enclosures:
1. ACDA Editorial Comments, GAO Report "ARMS CONTROL: IMPROVED COORDINATION OF RESEARCH NEEDED".
2. ACDA Substantive Comments for inclusion in GAO Report "ARMS CONTROL: IMPROVED COORDINATION OF RESEARCH NEEDED".

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International Affairs Division
United States General Accounting Office
Washington, D.C. 20548

ACDA SUBSTANTIVE COMMENTS
"ARMS CONTROL: IMPROVED COORDINATION
OF ARMS CONTROL RESEARCH NEEDED"

I. BACKGROUND, WHERE WE AGREE

A. General: The Director of the Arms Control and Disarmament Agency (ACDA) seeks every opportunity to improve the coordination of all arms control activities, including research and development (R&D). In this regard, the report of the General Accounting Office (GAO) entitled "Arms Control: Improved Coordination of Arms Control Research Needed" identifies and discusses a number of key issues that the ACDA Director and his staff have been actively seeking to resolve.

GAO notes that ACDA is required by law to coordinate arms control related research, but is limited in the effectiveness of such coordination by lack of funding, staff, and directive authority. Furthermore, with the exception of the special authority vested in the National Security Council, such directive authority does not (and in our view, should not) currently reside in any other agency. Nor does such authority reside explicitly in any interagency committee at this time. GAO notes the absence of any ACDA or interagency mechanism to evaluate planned and on-going research projects justified in terms of their potential contribution to arms control, with a view to exercising a go/no-go decision making role in project management.

GAO observes accurately in this report that ACDA makes a singular contribution to US national security deriving from its unique mission that cannot be guaranteed to be fulfilled if responsibility for program management rests with any other agency.

The central premise of this report is that there is a need for central authority to establish interagency requirements to evaluate whether ongoing or planned research continues to be justified (for arms control applications) and to avoid questionable research projects. This is a fundamental objective that the Director of ACDA has pursued in small, measured steps, and toward which we anticipate more significant progress in the future.

B. Problems Unique to "Arms Control R&D": Some of the problems highlighted in this report result from features of the arms control R&D landscape that have no counterpart in other areas of government or industry. The features of this terrain include lack of a central program management authority, mentioned previously; lack of a formalized requirements process as exists in the defense and intelligence communities;

a broadly dispersed "user" community; a broadly dispersed R&D performing community; a "user" community existing virtually independently from the R&D performing community; the potential need for a broad spectrum of technological support; dramatic shifts in anticipated applications that occur on a timescale that is orders of magnitude shorter than units of R&D planning time; changes in anticipated applications deriving from factors over which R&D program managers have little or no control, sometimes little or no knowledge; and tremendously high stakes associated with providing technology support needed for the strongest possible negotiated agreement.

Research, exploratory development and advanced development, which are by their nature somewhat "undirected", entail some duplication of effort. As efforts transition into prototype and production, it becomes necessary to evaluate the various candidate technologies against anticipated applications in order to find the "best" technology for the specific application at hand. And, when the first prototypes are large systems, such as in the case of seismic stations or CW destruction plants, the investment that is appropriate before a technology competition is held is substantial.

In any R&D program, whether for Energy, Defense, or private industry, an effectively managed research program includes parallel projects, many of which are doomed to termination by virtue of technological failure, excessive technological risk, absence of an eventual application (or, requirement), the development of more successful competitive technologies, or obsolescence in the face of more rapidly advancing technological developments.

In areas other than arms control, decisions regarding whether or not a project can be continued profitably in the face of high technological risk can be made at a pace that is in keeping with the normal R&D funding cycle, that is, over a period of many months or even years. Where an organization is sponsoring multiple parallel tracks of research, a decision not to continue one particular track is made by a centralized program manager in the context of the entire program. And, the stakes associated with whether or not a particular project is continued generally are not directly associated with an identifiable contribution to the national security. Furthermore, for the most part, the factors affecting a go/no go decision in other areas of research are largely within the control, or at least the awareness, of the R&D program manager.

Given the stark differences between other R&D environments and that of arms control, the need for effective direction and program authority is critical.

II. WHERE WE DIFFER

See comment 1

A. Informal Coordination and Other Successes: This report does not reflect the degree of informal coordination that occurs within the negotiating communities or the "successes" that have been achieved in arms control R&D. One example of such informal coordination includes ad hoc meetings of DOD CW program planners with ACDA and other agency representatives in which the proposed DOD program was examined in detail; specific project tasks were reviewed, modified, and in several cases written (by non-DOD personnel) at the table. Another example is in the conduct of the DOD Verification Technology Research and Development Working Group, in which representatives of other agencies are invited by DOD to participate in the review and planning of the internal DOD verification R&D program. A third example is in the coordination between DNA and DOE: DOE identified efforts that might have a contribution to the CWC for which DOE could not justify continuing funding from DOE mission funds, and the effort was transitioned to DNA with the support of all CW program managers.

See comment 2

Also, the report noted that the CW subgroup of the VTWG had planned to develop coordinated requirements, but had not done so at the time the report was completed. On the way to establishing such requirements, the CW group has had to define the process for doing so in this unique interagency environment. That process has advanced since the conclusions of this report were prepared, and the CW subgroup is now seized with the issue of common requirements. The process being defined in the CW area has general applicability to all areas of arms control supported by R&D, so that the considerable effort expended in defining it in a rational way is effort well spent.

See comment 3

B. Redundancy of effort vs. Accounting and Accountability: This report cites several parallel efforts as examples of ineffective interagency R&D program management. For example, this report questions the value of the DOE developing new methods of mass spectrometry for application to a CWC. While we agree that unnecessary redundancy and duplication of efforts are to be avoided, for reasons discussed above, we believe that parallel research efforts can be supported in an effectively managed R&D program. We would support R&D such as the DOE mass spectrometry effort, in general, as appropriate and contributing positively to US technological security. However, to fund such efforts totally from an arms control account, on the basis of their possible future contribution to a chemical weapons convention, is inappropriate.

The ability of ACDA or any other organization to assess agencies' accountability in arms control funding, whether for R&D, implementation, or negotiations support, has been confounded to date by the rapid pace of progress in the field of arms control. Until recently, arms control activities have been "unfunded" (that is, unprogrammed) in large part. Only recently have agencies other than ACDA begun to incorporate arms control requirements into their normal budget planning cycle. Even so, such requirements are generally not given as discrete budget items. In this regard, OMB directed agencies to identify what portions of their FY-92 budgets were directed to arms control implementation efforts. This initiative by OMB will make more transparent agencies' accountability in spending for arms control implementation. It would be helpful to identify funding for other activities as well, including verification and other arms control related research.

C. Reconciliation of funding with mission: The need for improved R&D coordination is complicated by a lack of accounting and accountability; it would be beneficial to reconcile agencies' funding and accountability with their mission. Wherever the opportunity presents itself, we have sought to further the concept of "mission-driven funding". Nowhere is there so great a divergence between agencies having mission responsibility and accountability for performing R&D, and agencies having the funding to do so, than in arms control.

Some believe that introducing the concept of mission-driven funding into arms control requires defining and identifying what constitutes "arms control related research," and is too difficult. Actually, the concept is in fact the natural driving process behind the defense and intelligence acquisition processes.

This report contains the view held by many as well that other agencies would resist transfer of funding (and control) to other agencies. While this is certainly often true, there are circumstances in which R&D program managers in other agencies would benefit by the transfer of funding and accountability to an agency such as ACDA that has no primary contractors and no subordinate laboratories. Specifically, when an activity is not directly related to the agency's primary mission, in times of austerity, funding for that activity is susceptible to reduction in favor of activities supporting hard mission requirements. In contrast, funds received on a customer basis provide continuing support for those secondary mission areas (e.g. arms control) and are not susceptible to cuts in the performing agency budget.

III. WHAT ARE WE, ACDA AND THE EXECUTIVE, DOING

A. ACDA: ACDA personnel have been actively working to address the issues described in this report.

The Agency has a Bureau devoted to verification issues. The Assistant Director of this Bureau has participated directly in the deliberations on major acquisition programs for verification systems. He also has participated in the formulation, articulation, and evaluation of verification architectures for all major arms control agreements to which the United States is a party, and in the assessment of the verifibility of those agreements.

As a matter of routine, the Director of ACDA and the Assistant Director for Verification and Implementation address the Director of Central Intelligence, the Arms Control Intelligence Staff, the President's Foreign Intelligence Advisory Board, and the Intelligence Community Staff on verification requirements. ACDA's Intelligence Division regularly introduces arms control verification requirements into the Intelligence Community's requirements process.

To provide additional support to this important area, and in keeping with the 1990 amendment to the ACDA Act, the Director of ACDA has undertaken to establish the position of Chief Science Advisor. The mission of the Office of the Chief Science Advisor includes coordination of interagency arms control R&D efforts. The dedication of our newest high level policy official to the problems discussed in this report, along with the creation and staffing of the associated Office, will make it possible for ACDA to enhance its well-established leadership role.

Finally, ACDA staff members work directly with counterparts in other agencies and the Intelligence Community responsible for R&D of technologies directly applicable to verification, to encourage efforts responsive to real needs and to terminate or redirect work with no evidence application to arms control.

B. DOD: The efforts of the DOD VTRDWG, and particularly the willingness of the chair of that committee to allow other agencies to participate in what is essentially internal DOD program planning and review, have been highly valuable.

C. Interagency: The Verification Technology Working Group has in fact been able to improve coordination of verification technology research and development. Verification technology requirements have been stated to the VTWG for utilization in the creation and direction of individual agencies' R&D programs; they have been stated to the Intelligence Community; and they have been addressed in numerous interagency documents.

With respect to the efforts to coordinate CW verification R&D, the report did not mention that although formal requirements and program guidance have not yet been elaborated, the CW community has worked very closely together in previous budget cycles to ensure that the requirements of all agencies were addressed, and that agencies were not in fact conducting unnecessarily duplicative work.

IV. CONCLUSIONS

A. Informal and Other Coordination: ACDA staff will continue to foster the cooperation, formal and informal, among agencies that has to date been responsible for considerable success in guiding programs to meet the requirements of all agencies and in keeping to a minimum any duplicative R&D.

B. Redundancy: We are willing to allow some judicious "redundancy" in basic research, and to some extent in exploratory and advanced development programs, as a natural element of an effectively managed R&D process, and as particularly necessary in an environment as fluid and dynamic as arms control.

C. Accounting and Accountability: We believe that additional precision in accounting and accountability in spending across all areas of arms control is required. We continue working with OMB and other agencies to make progress in this area.

D. Reconciliation of Mission with Funding: We believe that in some cases, further reconciliation of agency mission with accountability would be beneficial to all agencies concerned, as reflected by the DOE, DNA example cited previously.

E. Directive Authority: For the foreseeable future, it is unlikely that ACDA would derive directive authority for other agencies' verification technology R&D programs, either as an agency or as chair of the VTWG. Nonetheless, ACDA intends to continue to work through the VTWG and related mechanisms to further the elaboration of common, coordinated verification technology requirements and for providing guidance to the verification technology R&D community.

The following are GAO comments on ACDA's letter dated December 23, 1991.

GAO Comments

1. We cite specific examples of coordination between DOD and DOE and recognize the positive influence exercised by the Verification Technology Working Group in coordinating trial inspections, which helped define the U.S. chemical verification requirements and helped define DOD's chemical verification program. Informal coordination promotes information exchange but by its voluntary nature does not ensure that arms control research is effectively coordinated by either the Arms Control and Disarmament Agency or the Verification Technology Working Group, which was established by the administration to do so.

2. The Verification Technology Working Group was established nearly 2 years ago, in 1990. Group members acknowledge that the Group has not identified national goals or requirements applicable to all future treaties. As we note, the chemical subgroup has progressed in getting the Departments of Defense and Energy to help define existing programs and is working toward defining chemical verification requirements. The positive steps taken by the chemical subgroup to achieve coordination and begin the identification of requirements should be applied to other treaty areas as well. As described in option three, we believe that the Verification Technology Working Group could be strengthened to enable it to make "go/no go" decisions on specific projects, as agencies will resist centralized oversight of their programs.

3. We agree with the Arms Control and Disarmament Agency that ongoing research efforts being justified as essential to verification of arms control agreements support arms control. We believe, however, that centralized management, where research efforts are prioritized based on national goals and where parallel efforts are determined necessary to meet verification requirements, is essential.

Major Contributors to This Report

National Security and International Affairs Division, Washington, D.C.

Thomas J. Schulz, Associate Director
Louis H. Zanardi, Assistant Director
Patricia L. Martin, Evaluator-in-Charge
Barbara L. Wooten, Evaluator

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