**PROGRAM OF TECHNICAL ASSISTANCE
TO THE
ORGANIZATION FOR THE PROHIBITION OF CHEMICAL WEAPONS**

**Summary of Workshop
on August 10, 1994**

**Brookhaven National Laboratory
and
U.S. Army Chemical/Biological Defense Command**

Sponsored by:

Defense Nuclear Agency

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SUMMARY OF WORKSHOP*

INTRODUCTION

Currently, U.S. organizations provide technical support to the U.S. Delegation for its work as part of the Preparatory Commission (PrepCom) of the Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague. The current efforts of the PrepCom are focussed on preparations for the Entry-Into-Force (EIF) of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons (often referred to as the "Chemical Weapons Convention" (CWC)). EIF of the CWC is expected in 1995, and shortly thereafter the PrepCom will cease to exist, with the OPCW taking over responsibilities under the CWC. A U.S. program of technical assistance to the OPCW for its verification responsibilities may be created as part of U.S. policy objectives after EIF of the CWC.

In the summary below, comments by participants are presented in Square Brackets []. Some of the same points arose several times during the discussions; they are grouped together under the most pertinent heading.

OPENING OF THE WORKSHOP

Ms. Catherine Montie, Deputy Assistant Director, Arms Control and Test Limitations, Defense Nuclear Agency, opened the meeting with welcoming remarks and outlined the purpose, objectives and ground rules of the workshop. The purpose of the "Workshop on Program of Technical Assistance to the OPCW" on August 10, 1994 was to bring together the expertise and experiences of people involved in a Program of Technical Assistance to IAEA Safeguards (POTAS) with the expertise of those involved in research and development on verification technology for the CWC. This joining of expertise at the meeting was to help in identifying similarities and differences between the IAEA (and its safeguards responsibilities) and the OPCW (and its verification responsibilities pursuant to the CWC) which may affect the provision of technical assistance to the OPCW. In addition, suggestions and comments concerning the questions distributed in the read-ahead material were to be addressed in the afternoon, as shown in the agenda (see Appendix 1).

Any future program of U.S. technical assistance to the Technical Secretariat of the OPCW would not be identical to POTAS but can make use of U.S. experience with the IAEA and with POTAS in particular. A program for the OPCW would evolve its own structure, organization and process. Identification of the similarities and differences between the IAEA and OPCW and their verification requirements will be useful for exploring the needs and process for future technical assistance to the OPCW. The objectives of the workshop center on U.S. government interests.

*This work is sponsored by the Defense Nuclear Agency. The views expressed are those of the individual participants at the workshop and do not necessarily reflect the position of the Defense Nuclear Agency or the United States Government.

APPLICABLE PROVISIONS OF THE CWC

Mr. Gary Eifried, President, EAI Corporation, presented the provisions of the CWC which address the issue of technical support. The convention implies and establishes guidelines for several types of technical support: assist other state parties with implementation, assist Technical Secretariat, provide emergency and humanitarian assistance, assist in defensive measures, support scientific advisory board and provide experts. The specific articles referred to by Mr. Eifried are presented in Appendix 2. He noted that voluntary assistance and in-kind assistance funds will be established as provided in Article X.

[Attention was called to a difference between technical assistance to the OPCW for its verification responsibilities pursuant to the CWC and other kinds of technical assistance. Some of the references in Appendix 2 are concerned with assistance from some States, through the OPCW, to other States. Whether a program of technical assistance to the OPCW would include both kinds of technical assistance should be clarified.]

[U.S. technical assistance to IAEA safeguards are not based on a specific responsibility assigned to IAEA Member States pursuant to a multi-lateral obligation such as the Treaty on the Non-Proliferation of Nuclear Weapons (often referred to as the "Non-Proliferation Treaty" (NPT). The formal arrangements for U.S. technical assistance were agreed to by the IAEA and the U.S. government because they are mutually beneficial. It may be possible for the U.S. to similarly provide technical assistance to the future Technical Secretariat of the OPCW.]

[The mission of the OPCW seems narrower to some participants than that of the IAEA. The IAEA has a large effort for providing technical assistance to developing countries for the promotion of peaceful uses of atomic energy. However, the IAEA did not establish a fund for providing protective assistance similar to the kind called for under the CWC. The U.S. POTAS was restricted to technical assistance for the IAEA's verification responsibilities.]

[The funding of technical assistance to the OPCW should be established in a way which protects U.S. capabilities and insures that U.S. capacity to operate within the OPCW is not diminished.]

[Funding for technical assistance to the OPCW should be provided through a government entity which is not directly involved in implementation. For example, funding for POTAS is part of the funding to the Department of State. However, implementation of POTAS is effected through the government organizations having expertise, in particular, the Department of Energy, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission and, more recently, the Department of Defense.]

INTRODUCTION OF QUESTIONS

Mr. Stephen English, Chemical Biological Defense Command; Edgewood Research,

Development and Engineering Center (ERDEC), introduced the focal questions for discussions in the afternoon, as provided in Attachment 4 of the read-ahead material for the workshop. Mr. English reviewed the questions, stressing that they were based on the assumption that there will be a continuation of U.S. technical assistance after the conclusion of the OPCW PrepCom. He asked the participants to think about the questions as they listened to the presentations.

[A number of points were briefly raised by the participants at this time. One point related to the multiple types of assistance to be provided by the U.S. and is presented above under the heading "Applicable Provisions of the CWC". The other points are presented under the heading "Discussion of Questions" near the end of this summary report.]

SUPPORT OF THE U.S. DELEGATION TO THE PREPARATORY COMMISSION

Ms. Amy Gordon, Arms Control and Disarmament Agency, U.S. delegation to the PrepCom, addressed current support of the U.S. delegation to the PrepCom. The PrepCom is focused on three major areas leading to the entry-into-force (EIF) of the CWC: verification; establishment of a new internationally staffed implementing organization, the Organization for the Prohibition of Chemical Weapons (OPCW); and establishment of national authorities to implement the CWC. Meetings of experts are currently being conducted in the PrepCom in The Hague to address issues in these three areas.

Expert Groups are working on the assumption that EIF could occur in 1995. The OPCW will need trained inspectors and equipment ready to function within one month after EIF. Therefore, PrepCom preparations are critical to the effectiveness of initial inspections and collection of data declared by States. To facilitate agreement among Member States, U.S. experts have been sent to The Hague to assist the Experts Groups and the newly established Provisional Technical Secretariat of the OPCW in their preparations.

Of primary importance, verification-related expert assistance has supported development of the following: operational requirements for inspection equipment, inspection procedures, planning for inspector training, declaration formats, and model facility agreements. Issues related to the commercial chemical industry receive particular attention, focusing equally on declaration and inspection obligations. Other important areas in which experts have assisted include the development of confidentiality procedures and information management systems. This work is ongoing.

Establishment of a new internationally staffed implementation organization is underway, but not yet complete. Currently the provisional organization has a staff of approximately 120. By EIF it is expected to have approximately 400 on board, including an international inspectorate of at least 165. Intensive work has been done to establish a legal, administrative and budget framework for the new organization. Expert assistance has been critical in this area as well. Experts have helped establish financial and staff regulations, a structure for the program of work and budget, rules of procedure for the PrepCom, an agreement with the Host Country on Privileges and Immunities and

a host of other measures.

Individual Member States are in the process of developing their own National Authorities to liaise with the OPCW and oversee national implementation. Developing countries are seeking assistance from the PrepCom in setting up their National Authorities. Their requests focus mainly on identifying requirements of the CWC with which they must comply after entry into force. In addition, however, they are asking for help in planning the structure and functions of a National Authority. Only a few have also asked for funds to support establishment of a National Authority.

In this regard, the Dutch government has run courses to help inform Member States on requirements of the CWC which a National Authority must implement. These courses attempt to standardize information so that it can be used by any country, regardless of its particular situation.

U.S. technical assistance, as in the IAEA experience, seeks to establish an inspection regime which is well-planned and an inspectorate which is well-trained and well-equipped. In particular, the U.S. has provided technical assistance related to declaration and inspection planning regarding chemical weapons storage, destruction and production facilities and health and safety measures. More is needed, on an ongoing basis, to support the planning and implementation activities of the PrepCom up to entry into force of the CWC. In particular, assistance is needed on information systems, logistics planning and program planning and management. After entry into force, the need for U.S. technical assistance to the OPCW will likely continue, with greater emphasis on verification-related support.

To date, U.S. technical assistance has emphasized transfer of expertise through U.S. -drafted papers and expert support to the U.S. delegation in The Hague, although the U.S. has offered information management software and hardware, as well as inspector training support. For the foreseeable future, experts will be needed to provide support in the Hague in all the areas outlined above. This involves short-term visits of a few days, but may also involve provision of IAEA-like cost-free experts, who can work directly with the Secretariat for longer periods augmenting its expertise to address particularly important issues. In the longer term, U.S. technical assistance may also involve research and development on verification-related equipment or other specialized subjects.

The budget being established by the PrepCom is the baseline. It will increase after EIF when the OPCW will begin collecting declaration information and conducting inspections. It remains to be seen what resource restrictions the OPCW will experience.

The multilateral community involved in the OPCW PrepCom will take stock of technological developments, progress in verification technology and experience to re-think and improve the approach every few years. This will be an on-going, long-term exercise.

[Each adherent to the CWC must describe shortly after EIF the technical assistance in defensive measures which it intends to provide. An important aspect of U.S. policy is that such

technical assistance is voluntary.]

[The U.S. also has expertise in verification and other related areas (such as health and safety) which could be a valuable source of technical assistance to the OPCW. In particular, U.S. expertise in the use of verification equipment is invaluable. However, the equipment that will be utilized by the OPCW may not coincide with U.S. advice. A difference between the IAEA and the OPCW may be less U.S. control over the equipment selected by the OPCW.]

[Political motivations and geographic considerations will certainly influence choices of equipment. However, one must compare the evolution of the IAEA after its PrepCom with the current stages of the OPCW PrepCom. Inspection equipment used by the IAEA came from relatively few actors after the conclusion of the IAEA PrepCom. The OPCW PrepCom seems to have identified a larger number of actors which may help to de-politicize the organization. It is possible that equipment will be chosen by the PrepCom more on merits than on political and geographical factors.]

[U.S. contributions in the form of experts to work on the staff or along with the staff of the OPCW could be more valuable than contributions in the form of hardware.]

[The CWC provides a web consisting of declarations, reporting, visits to industry and a long term monitoring effort which includes visits to stockpiles. The provisions for challenge inspections in the CWC strengthens the monitoring system.]

[If the OPCW funding is restricted similar to the IAEA, the challenge inspection regime will be limited by the available resources which could diminish its strength.]

[The training of international inspectors raises many issues and concerns. The U.S. interest in the OPCW's selection of suitable technology for effective verification must be complimented with well trained users of the equipment. Differences in education, culture and language make a great challenge to successful verification. A high turnover rate of inspectors may also be expected. Long term assistance in the form of periodic equipment training may be one of the most valuable contributions the U.S. could make.]

[The U.S. can offer several unique contributions of expertise in certain subjects, such as storage facilities, destruction facilities and production facilities for chemical weapons. The U.S. can contribute significant expertise in the areas associated with existing chemical weapons.]

[The U.S. contribution to the IAEA concerning assistance in quality assurance and control was very high in terms of value-added. This could be a potentially valuable U.S. contribution to the OPCW. Communication should be expected between the OPCW and the IAEA. A need for long term technical assistance should also be expected.]

[A general political concern would be the creation of a perception that the OPCW is a tool of the U.S. This would decrease cooperation within the OPCW mechanism and the credibility of the OPCW, leading to a decrease in the influence of the U.S. The OPCW must be, and must be seen to be, an independent, technically competent verification operation.]

[The U.S. not only needs to arrange for coordination among U.S. agencies, but it must also have good communications with the internationally staffed OPCW and with other governments. Assessment of OPCW needs must take place at several levels and many areas of the organization. Organizational conflicts within the OPCW must be recognized and understood. U.S. Technical Assistance could provide a means of enhancing the informal communication between the secretariats of the IAEA and the OPCW.]

PROGRAM OF TECHNICAL ASSISTANCE TO IAEA SAFEGUARDS (POTAS) AND EMERGING SIMILARITIES AND DIFFERENCES

Mr. Raymond J. Parsick, International Projects Division, Department of Advanced Technology, Brookhaven National Laboratory, addressed the role of the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS). His presentation emphasized three major topics; (1) Experience from IAEA, especially the IAEA safeguards system for the Treaty on Non-Proliferation of Nuclear Weapons, (2) U.S. Technical Assistance to IAEA Safeguards; and (3) Emerging similarities and differences between IAEA and OPCW and their verification responsibilities which may affect the needs for technical assistance. He stressed that the work being done so far by Brookhaven National Laboratory (BNL), in cooperation with ERDEC, was concerned only with technical assistance to the OPCW for its verification responsibilities after EIF of the CWC. Part of the comparison between the IAEA and the OPCW was based on 11 scenarios and postulated verification activities for the OPCW, taken from an ERDEC report. The 11 scenarios are presented in Appendix 3, and the OPCW verification activities were provided in the read-ahead material for the workshop.

The presentation started with a brief historical description of IAEA safeguards so that participants to the workshop from the Chemical Weapons Community could see the context for U.S. technical assistance. The IAEA also had a PrepCom, following a proposal from President Eisenhower. At that time the U.S. was recognized as the leading authority on nuclear industry and one of the leading authorities on nuclear weapons. After the establishment of the IAEA, verifications of nuclear material by the U.S. in other countries under bilateral agreements were converted to trilateral agreements, under which the IAEA took over the U.S. verification rights and responsibilities. Subsequently, the conclusion of the Treaty on the Non-Proliferation of Nuclear Weapons greatly expanded the verification responsibilities of the IAEA. See Appendix 4 for the comprehensive set of slides.

[Although there are some bilateral agreements concerning the management and destruction of chemical weapons between the U.S. and Russia, the OPCW responsibilities will originate from the multi-national chemical weapons convention.]

[The issues of communication and coordination were raised. The U.S. must be aware of other nations and other organizations competing for the opportunity to provide specific types of assistance and to influence the OPCW. Good communication among U.S. organizations and with other nations should be used so that limited resources will be efficiently utilized. In particular, a U.S. inter-agency policy level mechanism should be established to determine and coordinate U.S. interests with respect to the OPCW.]

IAEA experience with available verification technology and off-the-shelf (OTS) equipment was discussed. OTS equipment can provide quick solutions to some problems, but often leads to implementation difficulties. R & D is usually needed for long term solutions. However, R & D looks expensive if it were to be in the budget of an international secretariat such as the IAEA and OPCW. In addition, R & D may not lead to a successful result. The U.S. had internal safeguards efforts, including R & D, for domestic purposes. U.S. technical assistance to IAEA safeguards used, and was greatly leveraged by, the internal U.S. programs.

[OTS equipment must be adapted for use by an international secretariat and must be maintainable. More sophisticated equipment resulting from R & D can place significant burdens on training for the users.]

[A participant felt that the presentation was too pessimistic about the benefits of the U.S. R & D in preparation for EIF of the CWC. Mr. Parsick assured the participants that preparation by the U.S. was excellent, but it was important how the new international technical secretariat made use of the input from the U.S. and from other countries. As Ms. Gordon implied in her presentation, the selection of equipment by the OPCW, at first or later, might not coincide with U.S. advice. This is only one example in which U.S. efforts may not reap the benefits they deserve. The way an international secretariat functions raises many issues which have to be addressed without a high likelihood of a successful outcome at first. Therefore, it is necessary to be prepared for an iterative process in which the OPCW plans, implements, evaluates and determines from its own experience what it must do to improve.]

[Some participants felt that the differences between the IAEA and OPCW were very important but the similarities were not. Mr. Parsick stressed that differences in technical content were clear and important, but similarities identified so far were very important in guiding how technical solutions should be presented to the OPCW so as to maximize their successful use by its Technical Secretariat. Technical assistance to the OPCW should recognize both the differences and similarities.]

[In the case of the IAEA a major expense is the cost of inspectors. Therefore, there has been a natural impetus to use equipment instead, especially in the form of unattended monitoring and measurement devices. This impetus is likely to exist also in the case of the OPCW to the extent permitted by the terms of the CWC and would be a stimulant for R & D on verification technology.]

[Behind the scenes communication between the U.S. and Technical Secretariat are important

for obtaining high value-added assistance. It is preferable to have the OPCW request assistance, especially that which the U.S. wants to provide.]

[While the IAEA and OPCW organizations will not be identical, it is important to recognize the IAEA experience and the U.S. technical assistance so as to anticipate areas of potential difficulty and to minimize problems which might arise.]

DISCUSSION OF QUESTIONS AND WRAP-UP

Ms. Montie introduced each of the questions and led the discussion, based on the assumption that there will be a continuation of U.S. technical assistance after the conclusion of the OPCW PrepCom.

Question 1: As noted today, some U.S. technical assistance to IAEA safeguards existed before POTAS was established. Such tasks were incorporated into the first annual POTAS program plan, along with additional tasks suggested by U.S. authorities, DOE laboratories and the IAEA. What planning exists for FY 1995-96 by each of your organizations to provide or develop technical assistance to the OPCW?

[There is technical support to the U.S. Delegation to the OPCW PrepCom. Whereas DNA has an on-going program of R & D, only sparse and fragmented efforts which may be pertinent after the conclusion of the PrepCom were mentioned by the other organizations. A lack of planning for FY 1995-96 by most of the organizations represented at the workshop probably will continue until the Office of the National Authority (ONA) is established.]

Question 2: As emphasized today, POTAS was initially funded in a Congressional Act. Since then it has been part of a line item in annual appropriation bills which provides funding to the Department of State. How might technical assistance to the OPCW be funded; e.g.,:

- a. as part of the budget of the U.S. national authority which will be responsible for assisting the OPCW in its inspections within the U.S. and for reporting under the CWC?
- b. by legislative action to give specific responsibility and funds for the program?
- c. other?

[An assistance program should be funded as part of an organization which does not execute the program. This would protect the program from politicization among U.S. government agencies. As in the case of the IAEA, technical assistance should be leveraged by making use of existing and reasonably well funded domestic programs, including R & D. A concerted effort to continue R & D is necessary to cope with technological developments and to ensure that defense capabilities are maintained.]

Question 3: Initial guidelines for POTAS limited the kinds of technical assistance so as to avoid undermining the IAEA's own program and budget. What kinds of technical assistance could be offered and how might this be done so as to have the proper impact on the OPCW's own program and budget?

[There was mention again of some of the support being provided to the U.S. Delegation for the OPCW PrepCom. It probably would be counter productive if U.S. voluntary contributions to the OPCW were insisted upon to be credited as part of the U.S. contribution to the regular budget of the OPCW. For example, other states would insist upon this also and the technical secretariat of the OPCW would have very little cash while receiving lots of voluntary technical assistance. The technical assistance may not lead to the desired improvements of the future implementation and at the same time the lack of cash would hamper current implementation.]

[Steps should be taken to provide re-employment rights to personnel from U.S. organizations working for short terms in the OPCW. In addition, there should be incentives for U.S. citizens to become part of the staff working in the OPCW, undertaking a two year or more commitment and relocating to The Hague.]

Question 4: A U.S. inter-agency policy steering committee and an inter-agency technical support coordinating committee were established for POTAS. In addition, an office for project management was established which, among other things, was the conduit for technical information on approved tasks with the IAEA Department of Safeguards. This included follow-up, evaluation and reporting on the integration of R & D results into routine use. What mechanisms might be used by the U.S. to have oversight and control over the U.S. efforts contributing to technical assistance to the OPCW -- and to influence utilization by the OPCW of the U.S. contributions ?

[Permanent oversight organization(s) for the coordination of continuing efforts by U.S. agencies should be established. Such arrangements should also be designed to facilitate communication with the Technical Secretariat of the OPCW and with other governments.]

Question 5: Many similarities and some differences between IAEA and OPCW can be identified at the levels of: U.S. policy objectives, multi-national nature of the organizations, use of on-site verifications, need for an improvement process, etc. These should be further identified. In addition, more of the similarities and differences at the technical level should be identified. What other sources of information and/or procedures should be used to identify similarities and differences between the IAEA and the OPCW?

[It would be useful for BNL to use the earlier work which identified operational requirements under the CWC. Several persons suggested that similarities and differences identified so far should be translated into a list of needs for technical assistance to the OPCW.]

Question 6: POTAS is a valuable example and source of information about establishing and operating a program of technical assistance to an international secretariat, considering the complications arising from international governing bodies, various cultures and national interests on the staff of the secretariat, as well as programs of assistance from other countries. However, not all of the important lessons learned from POTAS have been identified yet. Also, there may be experience from other programs which can be used to discover important lessons. Are there other lessons learned from the experience of POTAS, from the experience of technical assistance to another international secretariat, or any other similar experience which should be examined?

[The OPCW is concentrating its efforts and resources on preparation for EIF for the CWC. Planning beyond EIF is not currently being conducted. No other program of technical assistance to an international secretariat was identified.]

Question 7: The establishment and continuation of POTAS benefited from the interest of a Senate subcommittee, a Senator and the Administration, including the President, DOS, ACDA, DOE and the Nuclear Regulatory Commission. Who might be "advocates" for such a program in the case of OPCW; e.g., Secretary of Defense, State Department, ACDA, members of Congress?

[Senator Cohen from Maine was very instrumental in congressional action concerning the three year program of funding for R & D on verification technology related to the CWC. The office of Senator John Glenn had also been interested.]

ATTENDANCE

The list of attendees at the workshop is presented in Appendix 5. The read-ahead material distributed to the participants before the workshop is presented is Appendix 6.

AGENDA

Workshop On a Program of Technical Assistance to the OPCW

10 Aug 94

0800-0830	Sign-in; Coffee and Donuts	EAI
0830-0845	Welcome and Introductions	DNA
0845-0850	Workshop Purpose and Objectives	DNA
0850-0900	Applicable Treaty Provisions	EAI
0900-0915	Questions for Discussion	ERDEC
0915-0945	Support of the U.S. Delegation to the PrepCom	ACDA
0945-1015	Break	
1015-1145	Program of Technical Assistance to IAEA Safeguards and Emerging Similarities and Differences	BNL
1145-1230	Lunch	
1230-1430	Discussions of Questions	DNA
1430-1500	Wrap-up	DNA

Technical Support Provisions of the CWC

Type of Support	Treaty Reference
Assist other State Parties with implementation (e.g., Destruction Technologies, Evaluation of Production Facilities*)	Articles IV, VIII, Verification Annex
Assist Technical Secretariat (... "in particular provide assistance to the Technical Secretariat")	Article VII
Provide Emergency and Humanitarian Assistance (e.g., protective equipment, medical treatment)	Article VIII
Assist in Defensive Measures (e.g., equipment and advice regarding protection, detection, decontamination, medical treatment)	Article X
Support Scientific Advisory Board ("... State Parties may submit lists of experts..")	Article VIII
Provide Experts (... "establish group of experts from the TS... or elsewhere")	Articles VIII, IX, XI, Verification Annex
Voluntary Assistance Fund/In-Kind Assistance (must declare within 180 days after EIF)	Article X

*State Party Technical Support Implied

- I. Destruction of Chemical Weapons and Production Facilities**
 - Scenario 1. Chemical Weapons Declarations and Storage Facilities**
 - Scenario 2. Movement of Chemical Weapons Stocks to Destruction**
 - Scenario 3. Destruction of Chemical Weapons**
 - Scenario 4. Production Facility Declaration and Closure**
 - Scenario 5. Destruction of Production Facilities**
- II. Activities Not Prohibited**
 - Scenario 6. Schedule 1 Chemicals and Facilities**
 - Scenario 7. Schedule 2 Chemicals and Facilities**
 - Scenario 8. Schedule 3 Chemicals and Facilities and Other Chemical Production Facilities**
- III. Fact Finding**
 - Scenario 9. Investigation of Alleged Use**
 - Scenario 10. Challenge Inspections**
- IV. Facility Conversion**
 - Scenario 11. Conversion of Chemical Weapons Production Facilities**

Figure 1-1. CWC Verification Scenarios

APPENDIX 4

IAEA and OPCW BRIEFING SLIDES

IAEA AND OPCW

Presentation at DNA Workshop

August 10, 1994

R.J. Parsick

A.W. Reisman

BROOKHAVEN NATIONAL LABORATORY

IAEA AND OPCW

Information Sources at BNL

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- John Skalyo, Project Manager of the International Safeguards Project Office
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IAEA AND OPCW

Topics

- Experience from IAEA, Especially IAEA Safeguards System for Treaty on Non-Proliferation of Nuclear Weapons
- US Technical Assistance to IAEA Safeguards
- Emerging Similarities and Differences Between IAEA and OPCW

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IAEA AND OPCW

IAEA Budget Tensions

- **IAEA Missions**
 - Promotion
 - Regulation
- **Safeguards Functions**
 - Operations
 - Development

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IAEA AND OPCW

OPCW Budget Tensions

- Verifications
 - Monitoring Destruction of CWs
 - Verifying Non-Production
- Functions
 - Operations
 - Development

IAEA AND OPCW

IAEA Definition, Performance, and Improvement Cycle

A. Definition

- Legal Rights and Obligations
- Purpose of Verifications
- Inspection Goals
- Safeguards Approaches
- Technical Measures

IAEA AND OPCW

Safeguards Purpose and Objective for INFCIRC/153-Type Agreements (With INFCIRC/153 Paragraph References)

Ensure the Application of Safeguards to all Nuclear Material in all Peaceful Nuclear Activities (Para 2) in Order to

Verify that Nuclear Material is not Diverted to Nuclear Explosives (Para 2)

Detect in a Timely Manner Diversion from Peaceful Nuclear Activities of Significant Quantities to Nuclear Explosives or for Purposes Unknown and Deter by Risk of Early Detection (Para 28)

Using Material Accountancy and Containment and Surveillance (Para 29) and Other Proven Objective Methods (Para 74(e))

Through Cooperation Between States and IAEA (Para 3); in a Manner Satisfying Paras 4,5,6, and 87; and in so Doing, Verify Findings of State's System (Para 7)

Depending on Availability of Safeguards Technology (Para 6), Designated Inspectors (Para 9), Financial Resources (Para 15) and Arrangements With the State (Para 39)

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B. Performance

- Reports from State Authorities
- Operator's Records
- On-Site Inspection
- Conclusions from Inspection
- Conclusions from Set of Inspection
- Conclusions from Other Information
- Conclusions about Treaty Compliance

IAEA AND OPCW

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C. Improvement

- Evaluation of Inspection Effectiveness
- Evaluation of System Effectiveness
- Identification of Needed Improvements
- Identification of Means to Achieve Improvement
- Feed-Back to:
 - Inspection Planning
 - R&D
 - Other

IAEA AND OPCW

IAEA and OPCW Learning Process

- **As in the Case of the IAEA, Most of the Needs for Improvements in CWC Verification Activities and Equipment Will Be Learned Through OPCW's Inspection Experience**

IAEA AND OPCW

Substantial Investment of Resources

- Even When Technology and Equipment Already Exist Nationally, Adaptation for the conditions of the International Secretariat is Necessary
- Many of the Improvements Will Require R&D

IAEA AND OPCW

Difficulties for R&D in International Secretariat

- R&D Looks Expensive in the Budget of an International Secretariat
- Difficult to Attract Staff With Necessary Specific R&D Competence and to Have Wide Variety of Supporting Competence
- Local Limitations on Permissible Activities of an International Secretariat

IAEA AND OPCW

US Technical Assistance

- For a Decade, Emphasis Was on Building Adherence to NPT With Technical Effectiveness of Verifications As a Secondary Matter
- Initiation of POTAS at Time of Rapid Increase in IAEA Inspections Owing to European Community and Japan Joining NPT
- POTAS Intended to Strengthen, Make More Visible and Coordinate US Technical Assistance

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IAEA AND OPCW

Advantage to International Secretariat of National Technical Assistance Programs

- **Formal Acceptance of Such a Program Provides Access to Expertise, Facilities and Technology Far Superior to What Could Be Maintained In-House With a Reasonable Budget**

IAEA AND OPCW

Advantage to US

- **Technical Assistance Programs Exert Substantial Influence by Choosing to Support Certain Technologies and Activities**
- **Extra-Budgetary Technical Assistance Minimizes the Influence of Other States Over R&D for Improvements**

IAEA AND OPCW

Brief History of POTAS

- US Technical Assistance Program Established in 1977 as a Result of Senate Interest
- Funding Provided to Department of State Under the Foreign Assistance Act
- The Major Source of US Extra-Budgetary Direct Technical Assistance to IAEA Safeguards
- The Primary Mechanism to Transfer Technology from the National Laboratories and Industry to IAEA Safeguards
- Provided Over \$90M of Assistance Since 1977, Including \$8.6M in 1994
- The Model for 13 Other Smaller Member State Support Programs

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IAEA AND OPCW

Oversight

- **US Inter-Agency Policy Steering Committee**
- **US Inter-Agency Technical Support Coordinating Committee**
- **International Safeguards Projects Office**

IAEA AND OPCW

POTAS Areas

- Measurements and Associated Technology
- Training and Procedures
- System Studies
- Information Processing and Evaluation
- Containment and Surveillance
- Safeguards Evaluation and Administrative Support

Also, POTAS Helped the IAEA to Identify New Needs and Methods for Improvement

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IAEA AND OPCW

Distribution of POTAS Tasks Since 1977 (Percent of Total Funds Expended)

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US Program of Technical Assistance to IAEA Safeguards (POTAS) Organization

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IAEA AND OPCW

International Safeguards Project Office (ISPO) Functions

- **Coordinate the Work Among All Involved Parties**
 - US Agencies and Performers
 - International Secretariat
 - Nationals Operating Other Technical Assistance Programs

IAEA AND OPCW

International Safeguards Project Office (ISPO) Functions (Continued)

- **Provide Technical Program Management of POTAS**
 - Provide Independent Technical Assessments of IAEA Requests for Assistance
 - Identify Technology Providers/Developers
 - Arrange for Cost Free Experts
 - Monitor and Report on Projects

IAEA AND OPCW

POTAS Accomplishments

- Over 600 Tasks Completed
- Over 50 Types of Equipment Provided
- Cost-Free Experts Recruited and Supported for 1-6 Year Terms
- Specialized Software Developed for Inspection Equipment and In-House Computer Systems
- Training Developed and Provided to New and Experienced Inspectors
- Extensive Infrastructure Support Provided

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IAEA AND OPCW

Emphases for Effective US Technical Assistance

- Good Communication with International Secretariat
 - Identification of Needs
 - Follow-Up
- Good Communication with Nationals Operating Other Programs of Technical Assistance
- Proper Criteria and Procedures for Selecting Performers According to US Law Concerning Private Vendors and Governmental Organizations

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Two Examples From IAEA Point of View

- **“STAR” in 1980s**
- **“MIVS” in 1990s**

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IAEA AND OPCW

Emerging Similarities and Differences Between OPCW and IAEA

- Partial Results So Far
 - US Viewpoint
 - Framework of International Technical Secretariat

IAEA AND OPCW

Possible US Viewpoint

- **Similarity:** As in the Case of the IAEA, a Multi-National Governing Body Will Determine the Resources, Programs and Priorities of the OPCW
- **Similarity:** Both IAEA and OPCW Have Budget Tensions
- **Similarity:** As in the Case of the IAEA, the OPCW Also Must Cope Rapidly With a Large Obligation

IAEA AND OPCW

- **Similarity:** As in the Case of the IAEA, the OPCW Will Be Under Great Pressure to Do That Which Will Show Quick Progresss Even If the Long Term Results Will Be Poor. POTAS Encouraged Attention to Both Short Term and Long Term Solutions.
- **Similarity:** US Policy Objectives May Dictate a Need to Provide Technical Assistance to OPCW Outside the Regular Budget of the OPCW.

IAEA AND OPCW

- **Similarity:** Extra Budgetary Technical Assistance Can Avoid Discussion in the International Governing Body About Need and Technical Means for Improving the Effectiveness or Efficiency of Verifications
- **Similarity:** US Technical Assistance Can Exert Substantial Influence by Choosing to Support Certain Technologies and Activities

IAEA AND OPCW

Organization of Technical Assistance

- **Similarity:** POTAS Was Initiated With the Direct Involvement of a Technical Support Coordinating Committee (TSCC). One Function of the Committee Is to Approve Funding for Each Task That POTAS Agrees to Accept. A Similar Arrangement Would Be Useful in Case of Continuing Technical Assistance to OPCW.

IAEA AND OPCW

- **Similarity:** US Technical Assistance to IAEA Safeguards Was Directed Towards IAEA Activities Depending on Priorities Which Changed Over Time; For Example, More Use of Special Inspections Was Given Emphasis After the NPT Review Conference in 1990 and Given Great Emphasis After the Detection by the IAEA in the Course of Inspections in 1991 That There Were Major Undeclared Nuclear Activities in Iraq. Emphasis in Technical Assistance to the OPCW Will Probably Be Dynamic.

IAEA AND OPCW

Organization of Technical Assistance (Continued)

- **Similarity:** An International Safeguards Project Office (ISPO) Was Established in the Department of Advanced Technology at Brookhaven National Laboratory to Provide Technical Management of POTAS and Logistical Support, Including Facilitating Communication Between the IAEA and Developers. Similar Arrangements to Work With the Multi-National Secretariat and Other National Programs Will Be Needed in the Case of Technical Assistance to the OPCW.

IAEA AND OPCW

Organization of Technical Assistance (Continued)

- **Similarity:** In the Performance of Its Technical Management Role, ISPO Ensures That Requests for Technical Assistance to POTAS by the IAEA Department of Safeguards Are Competently Evaluated for Technical Feasibility and That Sound Recommendations to Meet the Request Are Made to the TSCC for Review and Possible Approval. A Similar Arrangement Would Be Useful in Case of Continuing Technical Assistance to OPCW.

IAEA AND OPCW

Organization of Technical Assistance (Continued)

- **Similarity:** After the TSCC Has Decided to Fund a Request
 - ISPO Provides the Technical Oversight to Ensure That the Product That Will Be Provided to the IAEA Meets the IAEA'S Stated Needs
 - If Provision of Experts to Serve on the Staff of the IAEA Is Approved by the TSCC, ISPO Recruits Qualified Candidates
 - ISPO Acts As the Conduit for Technical Information Between the IAEA Department of Safeguards and POTAS

A Similar Arrangement Would Be Useful in Case of Continuing Technical Assistance to OPCW

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IAEA AND OPCW

Organization of Technical Assistance (Continued)

- **Similarity:** Reviews of Foreign Travel Requests to Ensure That These Are Consistent With Approved Task Activities Will Be Needed.
- **Similarity:** When a Task Is Completed, Formal Transmission of the Results of Each Task to the OPCW and Other Parties Will Be Needed.
- **Similarity:** Procedures to Facilitate Procurement of Equipment From Commercial Vendors Will Be Needed.

IAEA AND OPCW

US Viewpoint and in the Framework of a Technical Secretariat

- **Similarities:** Many of the Activities Listed in an ERDEC Report Are the Same As for the IAEA, Even for the Scenarios Involving Storage, Movement and Destruction of Chemical Weapons
 - Many of the Pre-Inspection and Post-Inspection Activities by the OPCW Will Be Similar
 - Most the Headquarter Activities Will Also Be Similar
 - Some of the Inspection Activities Themselves Will Also Be Similar, Except in Particular Measurements Dictated by the Nature of the Material Involved

IAEA AND OPCW

Elements of CWC Verifications by OPCW

- **Infrastructure**
- **Pre-Inspection Activities**
- **Inspection Activities**
- **Post-Inspection Activities**
- **Headquarters Centralized Activities**
- **Chemical Analyses**

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IAEA AND OPCW

- **Similarity:** The Concepts, Techniques, and Procedures for Effective Verifications by the OPCW Are Being Further Developed. Some of These May Build Upon Similar Techniques and Procedures Used by the IAEA
- **Similarity:** Development of Documented Standard Procedures Will Be Needed
- **Similarity:** There Will Be an Immediate Need for Specific Equipment but Also a Longer Term Need for Improvements in Concepts, Equipment, and Procedures.

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IAEA AND OPCW

Verification Approaches

- **Similarity:** POTAS Tasks in the Area of System Studies Assisted the IAEA in Formulating Generic Safeguards Approaches. At the Same Time, Some Problems Which First Arose in Connection With Specific Facilities Have Been Expanded Into Generic Studies Which Treated the Problems Explicitly, Systematically and More Universally. Technical Assistance to the OPCW Could Profitably Include a Range of System Studies.
- **Difference:** Material Balance Accounting Will Not Be Used As a Measure of Fundamental Importance Under the CWC.

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IAEA AND OPCW

Verification Approaches (Continued)

- **Similarity:** A Verification Approach Under the CWC Will Be Needed for Each Type of Facility. This Will Have to Be Agreed With the Inspected States and Incorporated Into Working Arrangements.
- **Similarity:** POTAS Provided Various Studies on the Possible Extension of Randomization to Other Applications in IAEA Safeguards As Part of Efforts to Reduce IAEA Costs. Short Notice Random Inspections Developed by the IAEA With the Support of POTAS Could Contribute to the Development of Some Important Inspection Procedures for the OPCW.

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IAEA AND OPCW

Equipment Improvements

- **Similarity:** POTAS Assisted IAEA for Its Process of Identifying and Agreeing on Equipment Needs and for Setting Priorities and Time-Frames. Similar Assistance to OPCW Probably Will Be Needed.
- **Similarity:** Assistance in the Specification, Development and Prototype Production of Inspection Equipment Was an Important Part of the Effort Provided by POTAS. Technical Assistance to the OPCW Probably Should Include These Activities Also.

IAEA AND OPCW

Equipment Improvements (Continued)

- **Similarity:** Assistance in the Transition from Early Production Units to Further Production, With Feedback to Developers, Will Be Needed.
- **Similarity:** Assistance in the Definition and Development of an Infrastructure to Handle Equipment Procurement, Shipping, Maintenance, and Repair Will Be Needed.

IAEA AND OPCW

Cost-Free Experts

- **Similarity:** Cost-Free Experts Could Be an Important, Efficient and Effective Way to Provide Technical Assistance to an International Secretariat Such As the OPCW.
- **Difference:** The Initial Operational Interpretation by the OPCW of the Confidentiality Annex to the CWC Might Make the Arrangements for Full Use of CFEs Provided by the US Much More Difficult. Subsequent Interpretations Also Could Do So.

IAEA AND OPCW

General (Continued)

- **Similarity:** POTAS Assisted IAEA to Employ Management Consultants for Recommendations on Internal Management of Department of Safeguards.
- **Similarity:** Confidentially Issues Can Arise Again and Again.
- **Similarity:** Orientation for US Citizens Going to Work in the International Secretariat Will Be Needed.

IAEA AND OPCW

Other Similarities and Differences

- **Partial Results So Far, Especially at Level of OPCW Measurements**
- **Your Advice and Suggestions for How to Identify More Is Welcomed**
 - **At the Workshop**
 - **Mark up of Workshop Papers**
 - **Other**

APPENDIX 5

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READ-AHEAD MATERIAL
DISTRIBUTED ON AUGUST 2, 1994
FOR THE WORKSHOP

**SUMMARY OF INFORMATION ABOUT THE U.S. PROGRAM OF TECHNICAL
ASSISTANCE TO IAEA SAFEGUARDS (POTAS)
WITH COMPARISONS TO VERIFICATIONS
UNDER THE CHEMICAL WEAPONS CONVENTION**

Introduction

This summary to the workshop presents early results from work sponsored by the Defense Nuclear Agency. It provides information on the origin, guidelines and experience of the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS) in light of anticipated continuing technical assistance to the Organization for the Prohibition of Chemical Weapons (OPCW).

Origin of POTAS

The U.S. supported the establishment of the International Atomic Energy Agency and provided some technical assistance to its work in developing international safeguards on nuclear material since its inception. The safeguards obligations of the IAEA were rapidly increasing in the mid-1970s, and a coordinated program of U.S. technical assistance was necessary to achieve some of the U.S. policy objectives in this area. In particular, R&D was needed to improve the effectiveness of IAEA safeguards performance, and agreement in an international governing body to include sufficient funds for R&D was very difficult to achieve. A similar situation may become evident in the case of the OPCW, especially after the conclusion of its Preparatory Commission.

Technical Verification Measures

The functions and activities of the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS) are based on the safeguards functions and activities of the IAEA. Although the legal basis and the technical task of the future OPCW are significantly different from those of the IAEA, most of the pre-inspection, post-inspection and headquarters activities of the OPCW will be similar to those of the IAEA. Some of the inspection activities themselves will also be similar, except in particular the measurements and safety precautions dictated by the nature of the material involved.

R&D and other technical assistance may well be needed in order to achieve both effectiveness and efficiency in the verifications by the OPCW pursuant to the Chemical Weapons Convention (CWC). It is reasonable to expect that the need for improved verification measures under the CWC will be better identified and proven based on the early inspections by the OPCW and that these improvements could become available efficiently through a coordinated program of U.S. technical assistance to the OPCW.

Initial Guidelines for POTAS

At the beginning, POTAS was structured to have certain restrictions on the types and manner of offering technical assistance to the IAEA. The initial guidelines and restrictions changed rapidly as required to achieve U.S. policy objectives. It is reasonable to expect that a U.S. inter-agency body would be established to provide policy guidance on any technical assistance to the OPCW and that it would adjust the guidelines and restrictions accordingly.

Experience

The U.S. decided to establish POTAS in order to transfer technology available in the U.S. to enhance the effectiveness and efficiency of IAEA safeguards. The U.S. program was intended to strengthen, make more visible and coordinate the U.S. extra-budgetary technical assistance to the IAEA for its work in verifying compliance with the terms of safeguards agreements concluded by each State with the IAEA. Coordination of the U.S. technical assistance was necessary to ensure that such assistance was developed efficiently and did not interfere with U.S. policy objectives. Extra-budgetary technical assistance permitted the U.S. to influence developments without seeking approval of the IAEA Board of Governors. A voluntary program of technical assistance can emphasize certain directions and influence developments by its selection of R & D and other assistance which it provides, according to its national priorities.

The IAEA had to formalize its acceptance of the U.S. program under the terms of its statute. The U.S. program stimulated other Member States of the IAEA to establish programs of technical assistance also, although these are smaller and less broadly based than POTAS. There are now 13 safeguards support programs, each with its own priorities. For example, almost all of the technical assistance provided by the Canadian program serves the purpose of improving the effectiveness and efficiency of IAEA safeguards on the CANDU type of reactors marketed by Canada. Such national programs of technical assistance to the IAEA provide access to a world-wide pool of expertise, facilities and technology that is far superior to what could be maintained in-house with a reasonable IAEA budget.

The IAEA has had to establish mechanisms for the internal coordination of its requests to these programs, for testing and acceptance of the products of such programs and for introducing the use of such products into its routine activities, including inspections. U.S. technical assistance to the OPCW probably will stimulate offers from other Member States, leading the OPCW to establish internal mechanisms similar to those at the IAEA in order to coordinate and control a multiplicity of technical assistance programs and the tasks within them.

QUESTIONS

Assuming that there will be a continuation of U.S. technical assistance after the conclusion of the Preparatory Commission:

- 1 What planning exists for FY 1995-96 by each of your organizations to provide or develop technical assistance to the OPCW?
- 2 How might such technical assistance be funded; e.g.,:
 - a. as part of the budget of the U.S. national authority which will be responsible for assisting the OPCW in its inspections within the U.S. and for reporting under the CWC?
 - b. by legislative action to give specific responsibility and funds for the program?
 - c. other?
- 3 What kinds of technical assistance could be offered and how might this be done so as to have the proper impact on the OPCW's own program and budget?
- 4 What mechanisms should be used by the U.S. to have oversight and control over the U.S. efforts contributing to technical assistance to the OPCW -- and to influence utilization by the OPCW of the U.S. contributions ?
- 5 What other sources of information and/or procedures should be used to identify similarities and differences between the IAEA and the OPCW?
- 6 Are there other lessons learned from the experience of POTAS, from the experience of technical assistance to another international secretariat, or any other similar experience which should be examined?
- 7 Who might be "advocates" for such a program; e.g., Secretary of Defense, State Department, ACDA, members of Congress?

BACKGROUND & SUPPORTING INFORMATION ABOUT THE PROGRAM OF
TECHNICAL ASSISTANCE TO IAEA SAFEGUARDS (POTAS)
WITH INDICATIONS OF SIMILARITIES AND DIFFERENCES COMPARED TO
VERIFICATIONS UNDER THE CHEMICAL WEAPONS CONVENTION

INTRODUCTION

The functions and activities of the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS) are based almost exclusively on the safeguards functions and activities of the IAEA. Therefore, the legal basis, the administrative arrangements and the technical measures for IAEA verifications will be presented briefly, especially for the benefit of those not familiar with both the external and internal functioning of an international secretariat.

The autonomy of an international organization, and eventually of its secretariat, leads to less U.S. influence than imagined on the actual technical practices of the organization. These can be influenced, but with slow results, and much of the apparent compliance is illusory. Some of the arrangements and practices for the OPCW will be similar.

There are several reasons why technical assistance to IAEA safeguards was necessary. One important reason also dictated R & D as the area of original emphasis. It is very difficult for an international secretariat to actually perform R & D activities and even difficult for it to technically manage R & D done under contract for it by others.

R&D appears to be too expensive for an international Secretariat whose main function is intended to be operational (e.g., verification of a State's performance under a treaty) or administrative (e.g., coordinate assistance from some States to others), so it is very difficult to get approval for adequate funds for the specific R&D and for the necessary infrastructure.

It is difficult for such an international Secretariat to attract staff with the necessary specific competence and to have a wide variety of supporting competence. It is also difficult for such an international Secretariat to update the expertise for the specific R&D and to maintain the wide supporting competence.

There are local limitations on the permissible activities for such an international secretariat which make R&D too difficult except in limited circumstances.

However, it has been to the benefit of U.S. policy objectives for most of the R&D to be done outside the budgetary process of an international organization (in this case the IAEA),

thereby keeping it (and the introduction of its products into use) beyond the influence, if not control, of other States. This could also be the case for the OPCW.

IAEA SAFEGUARDS

Origin

The IAEA was established in 1957 as an independent intergovernmental organization in the United Nations family. By October 1993 it had 117 Member States. Their interests are represented through the IAEA's two principal policy-making organs -- the General Conference, which consists of all Member States, and the Board of Governors. Their decisions shape the IAEA's resources, programs, and priorities. The organizational structure of the IAEA is summarized in Annex I.

The aim of the IAEA as set out in Article II of the Statute is to "accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". Article III.A.5 of its Statute authorized the IAEA "to establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy".

Similarity with OPCW: Although both IAEA and OPCW have a dual mission, the conflict within each organization is different and perhaps significantly less for the OPCW. However, there will still be tension in allocating resources for the first decade between monitoring the destruction of chemical weapons and verifying the non-production of chemical weapons.

The first section of Article III.A.5 refers to the original concept of the IAEA as a major supplier of nuclear material and equipment. However, IAEA safeguards are based largely on the second part of Article III.A.5. They are, broadly speaking, a set of activities by which the IAEA seeks to verify that a State is not using nuclear material or equipment to develop or produce nuclear weapons. IAEA safeguards includes neither nuclear safety nor the physical security of nuclear material. In both of these areas the States themselves have the primary interest and responsibility, even though the IAEA has a role in these matters, e.g. in issuing standards, providing assistance and services and arranging for the exchange of experience.

Early safeguards agreements

A large number of safeguards agreements came into force before 1970. The legal basis for

such safeguards, which are applied to specific material and equipment only and not to the entirety of the State's nuclear activity, is described in an IAEA Information Circular identified as INFCIRC/66/Rev. 2. Many of the States which have concluded INFCIRC/66/Rev. 2-type safeguards agreements with the IAEA did so because most States would supply nuclear material or equipment to them only if IAEA safeguards were applied to the material or equipment in the recipient State. Many of these early safeguards agreements are suspended while the State has a safeguards agreement pursuant to the NPT.

In the case of some countries not party to NPT, INFCIRC/66/Rev. 2-type agreements have come to cover all known nuclear material and plants in the State concerned. However, such States have no legal obligation to make known all their nuclear activities or to submit them to IAEA safeguards.

Difference with OPCW: The IAEA has to cope with important differences in the kinds of legal rights and obligations according to the specific safeguards agreement; the OPCW obligations may be more homogeneous, except for monitoring the destruction of existing chemical weapons in a few States for the first decade.

Comprehensive Safeguards Agreements

The successful conclusion in 1968 of the negotiations on a treaty designed to prevent the further spread of nuclear weapons -- the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) -- was a landmark in the history of non-proliferation. The Treaty entered into force in March 1970 and now over 150 States are party to it. These include all the five declared nuclear weapon states (China, France, the Russian Federation, the United Kingdom and the United States of America).

Each non-nuclear-weapon State that becomes party to the NPT agrees not to acquire nuclear weapons or other nuclear explosive devices (Article II). It also agrees to conclude a comprehensive safeguards agreement with the IAEA for the application of safeguards to all its peaceful nuclear activities, present or future, with a view to verifying the fulfillment of its obligations under the Treaty (Article III). In return, the Treaty recognizes (in Article IV) the right of all parties to participate in the fullest possible exchange of equipment, materials, and scientific and technological information for the peaceful uses of nuclear energy. The parties also undertake to pursue negotiations in good faith towards nuclear disarmament (Article VI) and re-affirm their determination to achieve the discontinuance of all tests of nuclear weapons (Preamble).

Although not obliged to conclude safeguards agreements, the nuclear weapon States have agreed that IAEA safeguards may be applied to all or part of their civil nuclear activities. The nuclear weapon states have done this, inter alia, to demonstrate that they will not derive any

commercial advantage by not making their civil facilities subject to international inspection.

In addition to the NPT, two regional treaties which have the objective of preventing the spread of nuclear weapons have been concluded. The Treaty for the Prohibition of Nuclear Weapons in South America (the Treaty of Tlatelolco, actually concluded before the NPT) is now in force for many countries in the region. This Treaty requires its members to conclude comprehensive safeguards agreements with the IAEA. The South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga) also requires each State party to conclude with the IAEA a comprehensive safeguards agreement that will be equivalent in its scope and effect to an agreement required in connection with the NPT.

To implement the safeguards requirements of the NPT, the IAEA needed to devise a safeguards system suitable for application to the complex nuclear fuel cycles of the advanced industrial countries that were expected to join the Treaty, i.e. a safeguards system applicable to reactors and to the conversion, enrichment, fabrication and reprocessing plants which supply and process the reactor fuel. This comprehensive safeguards system, devised in 1970, is set out in IAEA document INFCIRC/153(corrected). The NPT, the Tlatelolco Treaty and the Rarotonga Treaty require that all of the nuclear material in a signatory State be declared and submitted to safeguards. The Treaties also require that any nuclear material which the State subsequently acquires be also declared and safeguarded.

Technical measures

The IAEA Board of Governors requested the Director General to use INFCIRC/153 as the basis for negotiating safeguards agreements between the Agency and non-nuclear-weapon states part to the Treaty on the Non-Proliferation of nuclear weapons. Part II of INFCIRC/153 specifies the procedures to be applied for the implementation of the safeguards provisions of Part I of that document. Paragraph 29 specifies the use of material accountancy as a safeguards measure of fundamental importance, with containment and surveillance as important complementary measures. Paragraph 30 specifies that the technical conclusion of the Agency's verification activities shall be a statement, in respect of each material balance area, of the amount of material unaccounted for over a specific period, giving the limits of accuracy of the amounts stated.

In effect, this calls for a normal engineering procedure often referred to as material balance accounting. Such a balance compares the amount of nuclear material calculated to be present against measurements of the nuclear material found to be present, thus yielding an objective determination of the amount, positive or negative, which appears to be unaccounted for. The result is evaluated inter alia by comparison with the limits in accuracy of the measurements involved, thus incorporating a fair and objective standard for IAEA conclusions.

Difference with OPCW: Material balance accounting will not be used as a measure of fundamental importance under the CWC.

Similarity with OPCW: The concepts, techniques and procedures for effective verifications are still to be worked out. Some of these may build upon similar techniques and procedures, e.g. short notice random inspections, developed and used by the IAEA.

To meet the obligations of paragraphs 29 and 30, a safeguards approach is necessary for every nuclear facility subject to IAEA safeguards. Each safeguards approach describes the inspection activities to be conducted; the measurements to be made and the equipment, instruments and techniques to be used so that the inspection goals for the facility can be attained at the required intervals. If the inspection goals at a facility cannot be routinely or efficiently attained, a comparison of the safeguards implementation practices to the requirements of the inspection goals is important in identifying remedial actions, which often lead to R&D effort.

Similarity with OPCW: A verification approach under the CWC will be needed for each type of facility. This will have to be agreed with the inspected States and incorporated into working arrangements.

Chart A depicts the principal elements of the IAEA safeguards system which flow from the legal basis, including the technical verification activities, the conclusions, the post-hoc evaluation of effectiveness, and the internal and external reporting of achievements and problems. Annex 2 lists the resulting requirements associated with the boxes A through E in Chart A.

These requirements lead to various verification activities, such as records examinations, comparison of records and reports, measurements, sampling, analyses and comparisons of data to be performed by the IAEA as part of routine, ad hoc and special inspections and data processing, analyses, comparisons and evaluations performed at IAEA Headquarters. POTAS assisted the IAEA in all of these areas.

SAFEGUARDS PURPOSE AND OBJECTIVE FOR INFCIRC/153-TYPE AGREEMENTS (WITH INFCIRC/153 PARAGRAPH REFERENCES)

CHART A

Similarity with OPCW: Many of the pre-inspection and post-inspection activities by the OPCW will be similar to those by the IAEA. Most the Headquarter activities will also be similar. Some of the inspection activities themselves will also be similar, except those dictated by the nature of the material involved.

U.S. PROGRAM OF TECHNICAL ASSISTANCE

Initiation of POTAS

The U.S. Program of Technical Assistance to International Atomic Energy Agency (IAEA) Safeguards (POTAS) was proposed by U.S. President Gerald Ford in February 1976 and was sponsored by Senator John Glenn in the Senate. The IAEA had already been performing inspections for about 15 years. This included inspections for about four years pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). It was important at that time to initiate major technical assistance because the IAEA's responsibilities and activities were rapidly increasing owing to the entrance of Japan and the European Community into the NPT. This brought a large number of new and complex nuclear facilities quickly under IAEA safeguards.

Similarity with OPCW: The OPCW also must cope rapidly with a large obligation.

The resulting Congressional act (the Foreign Assistance Act of 1976) provided \$5 million over 5 years for the program. A supplemental amount was provided shortly into the first year. See Table 1 for a matrix of contractors and a summary of funding for the first five years.- The program was later extended beyond the initial 5 year-period. The annual amount was also increased, reaching \$8.6 million per year in 1994.

Objectives of POTAS

The primary purpose of POTAS was to transfer technology available in the U.S. to enhance the effectiveness and efficiency of IAEA safeguards. The U.S. program was intended to strengthen, make more visible and coordinate the U.S. extra-budgetary technical assistance to the IAEA for its work in verifying compliance with the terms of safeguards agreements concluded by each State with the IAEA.

Policy Guidance

A U.S. inter-agency policy committee was established, as well as a technical support coordinating committee.

TABLE 1
MATRIX OF CONTRACTORS
FOR THE FIRST FIVE YEARS OF POTAS
(1977 through June 1981)

<u>CONTRACTOR</u>	<u>FUNDING</u>
ANL	\$ 592,000
BNL ¹	1,201,200
BPNL	651,000
INEL	269,400
LANL	4,117,000
LLNL	205,000
MOUND	230,000
NBL	1,469
NBS	433,000
ORNL	440,000
SANDIA	3,914,000
Special Tasks ²	1,533,571
Direct assistance to IAEA ³	7,752,000
TASTEX Tasks ⁴	<u>1,843,500</u>
TOTAL	\$23,183,140

¹Division of Safeguards, Safety and Nonproliferation, which is separate from the International Safeguards Project Office.

²Travel and incidental costs related to safeguards but not connected to an active IAEA task, e.g., annual travel by IAEA staff to discuss the program with U.S. Government officials.

³Contributions by POTAS to IAEA for travel of IAEA staff to external training courses, employment of U.S. approved Cost Free Experts as staff members, including costs for private U.S. contractors paid directly by IAEA.

⁴Temporary, pre-existing U.S. cooperative effort with Japan and France for the benefit of IAEA safeguards which was subsumed into the same arrangements as POTAS.

Initial Guidelines

The U.S. program was to be structured so as to avoid undermining the budgetary process of the IAEA.

The technical assistance was to be limited to studies, designs and prototypes. It was not to include more than one piece of equipment (or instrument) of each type; the procurement of multiple instruments, etc., for use by the Department of Safeguards was to be the responsibility of the IAEA.

Maintenance, transportation and repair of the equipment and instruments was to be the responsibility of the IAEA.

The IAEA was to bear no direct costs for the technical assistance provided by the U.S. program. This included the cost of employing experts provided by the U.S. program to serve on the staff of the IAEA. Thus, such experts are called "Cost-Free Experts" (CFEs).

Similarity with OPCW: Many of the initial POTAS guidelines were modified; some were changed very early in the POTAS effort. Inter-Agency guidelines for technical assistance to the OPCW will probably also be subject to significant changes.

POTAS effort prior to 1994

POTAS contributed in many ways to the development and implementation of IAEA safeguards. In the early years, the emphasis was on research and development of equipment and safeguards approaches. Soon thereafter, POTAS added assistance in the areas of system studies, computerized information treatment, evaluation, training of IAEA staff and deployment of equipment for field use. More recently, support in the procurement, use and maintenance of equipment has been given additional emphasis. Thus POTAS soon became broad technical support for IAEA safeguards which of necessity went beyond the initial areas of equipment, instruments and techniques.

Similarity with OPCW: Initial offers of technical assistance to the OPCW probably will be restricted in ways similar to those applied initially in the case of POTAS. Additional types of technical assistance and fewer restrictions will probably be authorized over time according to what is seen to be necessary for U.S. policy objectives.

The POTAS activities are grouped in the following areas:

- A Measurements and associated technology;
- B Training and procedures;

- C System studies;
- D Information processing and evaluation;
- E Containment and surveillance;
- F Safeguards evaluation and administrative support.

Also, POTAS helped the IAEA to identify new needs and methods for improvement and was responsive to IAEA requests. Annex 3 summarizes some of the key contributions of POTAS.

FUNCTIONS OF THE INTERNATIONAL SAFEGUARDS PROJECT OFFICE

Chart B depicts the functioning of the International Safeguards Project Office. Recently, some changes have been made which in part expands the range of activities.

The principle areas of ISPO activity are as follows:

- Facilitate communication among U.S. participants
- Facilitate communication with the international secretariat (IAEA)
- Facilitate communication with nationals operating other technical assistance programs
- Provide overall management of tasks, including
 - Task request process and task cycle
 - Task planning
 - Task management
 - Reporting
 - Guide the development and implementation of necessary technology
 - Arrange for CFEs
 - Initiate other actions

A description is provided in Annex 4.

CWC VERIFICATIONS BY OPCW

It is necessary to postulate the types of verification activities which will be performed by the OPCW in order to identify many of the similarities and differences which can be expected in comparison to POTAS. Such activities are summarized in a report by ERDEC (EAI report 05/092/036F). See Annex 5.

U.S. Program of Technical Assistance to IAEA Safeguards (POTAS) Organization

CHART B

Similarities between IAEA and OPCW: Many of the activities listed in Annex 5 from the ERDEC report are the same as for the IAEA, even for the scenarios involving storage, movement and destruction of chemical weapons.

Further work is necessary to describe the concepts and to list more details and examples of what verification activities will be done by the OPCW so that this list can be agreed, modified and/or augmented. This is necessary for use in comparison with IAEA verifications so as to better identify all of the similarities and differences.

PREVIOUSLY IDENTIFIED KEY ISSUES

Annex 6 summarizes salient points from an early multi-DOE-laboratory report. A number of similarities and differences can be observed in that summary. A principal product from the current task will be a better identification of all of the similarities and differences between verifications by the IAEA and OPCW and between POTAS and continuing technical assistance to the OPCW after conclusion of the Preparatory Commission.

Additional examples

About half of the U.S. support to IAEA safeguards has been in the form of Cost-Free Experts. This has been proven to be efficient and effective. This has been the result of providing the correct person (capable of working well in an international setting), with the right expertise (e.g., selecting and installing a data base but not to run it), at the right time (soon after the need is identified and only for the time necessary).

Similarity with OPCW: Cost-Free experts could be an important, efficient and effective way to provide technical assistance to an international secretariat such as the OPCW.

Two of the first CFEs were made available to assist in the development of computerized information treatment. As the work progressed and real safeguards information was used to test the data bases, the CFEs were authorized, on the basis of a need-to-know, to have access to the safeguards data. This was partly a recognition that any access to the mainframe computer by computer specialists might allow circumvention of administrative and software protection against unauthorized access to data in the mainframe computer. Thus, questions about CFEs having access to safeguards confidential information were settled early in the history of POTAS. Recently, one of the Operations divisions in the Department of Safeguards asked the IAEA legal division about the accessibility to specific information by a contractor doing work for the IAEA under a POTAS task. This led to a legal opinion which implied that many persons should not have access, including CFEs and members of the IAEA's Standing Advisory Group on Safeguards

Implementation (who are advisors to the IAEA's Director General, appointed by him in consultation with Governments). More formal conditions were set for a CFE to have access to Safeguards information. All of the CFEs supplied by the U.S. meet the new conditions and can have access to Safeguards information if their specific work requires it.

Similarity with OPCW: Confidentiality issues can arise again and again.

Difference with OPCW: The operational interpretation by the OPCW of the confidentiality annex to the CWC might make the arrangements for full use of CFEs provided by the U.S. much more difficult.

One of the most important lessons learned from the POTAS experience is that it is necessary but very difficult for the International Secretariat and the contractor funded by the program of technical assistance to plan jointly every aspect of a task, from definition through to implementation, and then to meticulously follow the plan. While this need seems obvious, there are too many pressures on an international secretariat to move ahead quickly on a newly recognized obligation or concept. It often is under pressure to proceed without having the staff or internal resources and infrastructure to consider and work out plans and to follow-up on actions. Once work is started it can too easily be carried away by the momentum of the contractor. This leads to waste when the contractor does not produce a product that the international secretariat can use to satisfy the obligation and to do so sufficiently often to justify the cost.

Similarity with OPCW: The OPCW will be under great pressure to do that which will show quick progress even if the long term results will be poor.

ANNEXES

Annex 1 ORGANIZATIONAL STRUCTURE OF THE IAEA

Board of Governors

The Board of Governors generally meets five times a year - in February and June, in September immediately before and after the regular annual session of the General Conference, and in December soon after the meetings of the Technical Assistance and Cooperation Committee. It examines and makes recommendations to the General Conference on the IAEA's accounts and program and budget and considers applications for membership; it also approves safeguards agreements and the publication of the IAEA's safety standards. In addition, the Board has the responsibility for appointing, with the approval of the General Conference, the Director General of the IAEA.

General Conference

The General Conference meets once a year to consider, among other things, the Board of Governors' report for the previous year, to approve the budget and any application for membership. It has the authority to request from the Board of Governors reports on any questions relating to the functions of the IAEA.

During its regular annual session, the Conference conducts a wide-ranging general debate on the IAEA's policies and program and examines a variety of matters brought to its attention by the Board of Governors, the Director General and individual Member States.- The Conference is particularly important as a forum where Member States can make their views known.

Secretariat

The Secretariat has a total staff of about 2000 of which three fourths are in regular authorized posts. Of these about 650 are in the Professional and higher categories, representing about 80 nationalities. The other thousand or so regular staff members come under the General Service category - clerical, secretarial, administrative and other support staff - and are generally recruited locally.

In addition to these regular staff members, the Secretariat also employs about 500 other staff on temporary assignments, or as cost free experts and staff funded from extra-budgetary sources.

The Director General, appointed for terms of four years, is the chief administrative officer of the IAEA. He is assisted by five Deputy Directors General, heading the Departments of Technical Cooperation, Nuclear Energy and Safety, Research and Isotopes, Safeguards, and Administration.

Annex 2 VERIFICATION REQUIREMENTS UNDER NPT

The verification requirements are listed below (paragraph numbers in parentheses refer to INFCIRC/153) in accordance with the corresponding boxes in Chart A in the main body of the report. These requirements, among other things, dictated the areas of technical assistance of interest to the IAEA over the years. U.S. technical assistance was directed to such IAEA activities depending on the current emphasis. For example, the area E was given great emphasis since the NPT Review Conference in 1990.

A. Verification of the continued presence (or the correct accounting) in peaceful activities of all nuclear material in the State's records and reports system:

- 1 Independent measurements of flows and inventories of various chemical and physical forms of nuclear material sufficient to detect the absence of significant quantities (paras 46(b), 74(b), 108, 116);
- 2 Ad hoc inspections to verify imports and exports of various chemical and physical forms of nuclear material (paras 71 (c), 93, 96);
- 3 Verifications of the State's system's physical inventories and material balances at intervals sufficient for IAEA conclusions (paras 46(c), 67);
- 4 Sampling plans that provide effective safeguards with optimum cost-effectiveness and a risk of detection sufficient to deter diversion of nuclear material (paras 6, 28);
- 5 Containment and surveillance measures to maintain validity of previous measurements in order to provide optimum cost-effectiveness (paras 6, 46(b)(ii));
- 6 Application of the above measures at intervals sufficiently frequent to provide timely detection and to deter by risk of early detection (para 28);
- 7 Special inspections with access to additional information and locations within a safeguarded material balance area to investigate special reports on loss of nuclear material or to verify continued presence of nuclear material (paras 68, 73, 77);

B. Verification of removals of nuclear material from peaceful activities so as to verify that all removals are included in the State's records and reports system:

- 8 Examination of operator's records and comparison with State's reports to confirm their consistency for all removals from safeguards (paras 71(b), 72(a) and (c) 74(a));
- 9 Comparison of shipper's records and reports to those of the receiver to confirm all transfers of nuclear material (paras 72(a) and (c), 74(a), 94, 97);
- 10 Containment and surveillance measures to ensure completeness of flow measurements (paras 29, 46(b)(ii), 46(f), 74(d), 75(d) and (e));
- 11 Special inspections to investigate special reports on loss of nuclear material or containment (paras 68, 73(a), 77);

C. Verification that nuclear material in State's records and reports system is used solely for peaceful purposes (i.e., is not used for a nuclear explosive or an unknown purpose):

- 12 Examination and verification of design information for each nuclear facility to confirm consistency of facility purpose and important equipment items with the nuclear material forms and compositions (paras 43, 45 through 48);
- 13 Observation and measurement to confirm consistency of nuclear material form and composition with records, reports and design information (paras 43(b), 57, 58(a), 64(a), 72);
- 14 Special inspections with access to additional information and locations within a safeguarded material balance area to verify absence of non-peaceful uses within the material balance area (paras 73, 77);

D. Verification that all nuclear material imported into, present in or produced in peaceful activities is included in State's records and reports system:

- 15 Verification of design information (paras 43(b), 48);
- 16 Observation during routine inspections to confirm absence of unreported modifications to design (paras 45, 48, 74(c), 75(b));
- 17 Examination of records and comparison with reports to confirm their consistency (paras 71(b), 72(a) and (c), 74(a));
- 18 Comparison of shipper and receiver reports and records to confirm all transfers (paras 72(a) and (c), 74(a), 94, 97);
- 19 Comparison of reports and records with other available information on possible imports (para 73(b));
- 20 Containment and surveillance measures to insure completeness of flow measurements (paras 29, 46(b)(ii), 46(f), 74(d), 75(d) and (e));
- 21 Observation to confirm absence of unreported nuclear material in open reactor core (para 72(b));
- 22 Non destructive assay to confirm absence of unreported nuclear material (e.g. highly enriched uranium in a low-enriched uranium enrichment plant) (paras 72(b), 74(b), 75(d));
- 23 Other methods to confirm absence of unreported nuclear material or its production (paras 47, 58(a), 74(e), 115);
- 24 Special inspections with access to additional information and locations within a safeguarded material balance area to verify absence of undeclared nuclear material and processing in the material balance area (paras 73(b), 77);

E. Verification of the absence of undeclared nuclear material and activities outside of peaceful activities and State's records and reports system:

- 25 Analysis of safeguards data and conclusions indicating possible undeclared activities or nuclear material (para 73(b));
- 26 Analysis of other available information indicating possible undeclared activities or material (para 73(b));
- 27 Special inspections with access to additional information and locations outside safeguarded material balance areas to verify absence of undeclared nuclear material and activities (paras 73(b), 77)).

Annex 3 SOME KEY CONTRIBUTIONS OF POTAS

General

POTAS has assisted and encouraged an improvement in the IAEA's internal process for soliciting and making use of external support. These improvements include the process for identifying needs; specifying requirements for research, development and implementation support; assigning priorities and time-scales; following up on progress and integrating the results into routine safeguards implementation. This led in 1992 to an integrated program approved in the IAEA Department of Safeguards for research, development and implementation support which includes almost all of the requirements for strengthening IAEA safeguards, often referred to as Program 93 + 2, as recently discussed by the IAEA Board of Governors. Most of the other requirements for Program 93 + 2 and for IAEA actions for the United Nations Security Council are being met outside of POTAS by specialized laboratories of the Department of Defense and the Department of Energy.

In general, the provision of Cost-Free Experts (CFEs) is one of the key contributions by POTAS which has a major impact on the IAEA's performance. These CFEs are a diversified group of technical experts whose overall contributions are so significant they deserve special mention. Their impact results generally by POTAS providing the right person, at the right time for important IAEA needs. Although they can not carry out IAEA inspections under Safeguards Agreements, they are used by the IAEA to solve important problems and often directly assist the inspectors in Vienna and in the field. The experts cover a range of IAEA needs, including Non-Destructive Assay (NDA) techniques, training, management procedures, evaluation methods, quality assurance, data processing, creation of specialized software, and specific knowledge needed for safeguarding major new facilities such as enrichment and reprocessing plants. Some of the details of the contributions by CFEs are included below.

Equipment and instruments

CFEs provided by POTAS have had a major impact on the development, deployment, use and maintenance of equipment. Much of the internal work of the sections responsible for development and maintenance is made possible or actually performed by such CFEs. Currently they are used extensively for writing and getting approval of the procedures for operating the equipment for NDA and Containment and Surveillance (C/S) and for producing the tailored software needed by the IAEA for its use of instruments. In addition the CFEs are playing a major role in supporting the deployment of the Modular Integrated Video System (MIVS) which is an essential part of the IAEA's program to replace world-wide the film-based surveillance systems for which film and spare parts are no longer purchasable.

The specification, development and prototype production of MIVS was an essential effort provided by POTAS. The process involved all the important steps including those dictated by Quality Assurance considerations. Early production of field units, acceptance testing and feed-back for design changes and further production were accomplished with the support of POTAS. The process was the most thorough for any equipment produced for the IAEA and has provided very valuable lessons and an excellent example for other equipment. There were more than 150 MIVS units installed in the field as of the end of 1993 and these provide most of the essential surveillance information needed by the IAEA world-wide, including in Iraq and the Democratic People's Republic of Korea (DPRK).

The development, production, deployment and cycle of improvements of MIVS under POTAS has been a major effort and achievement. Although there are improvements in in-the field performance still to be accomplished, this major effort has had a correspondingly major impact because MIVS units already are the work-horses of IAEA surveillance. MIVS units are used to monitor the large amounts of irradiated plutonium which are under IAEA safeguards at many facilities, such as power reactors and reprocessing plants. It is also used to monitor certain special situations.

The amount of irradiated plutonium under safeguards has doubled in less than a decade and will continue to be the fastest growing part of the inventory to be safeguarded. Therefore, surveillance by MIVS is very important to the cost-effectiveness of safeguards and was a major contributor to the reduction in recent years in the cost of IAEA safeguards per quantity of safeguarded nuclear material.

To aid in the major effort of reviewing the large number of surveillance images routinely gathered, POTAS funded the development of an automatic reviewer, called MARS, which is currently undergoing acceptance testing. Such automatic reviewers are expected to be ready for field use in the middle of 1994.

POTAS also provided important help leading to completion, deployment and use of Core Discharge Monitors (CDMs) at certain nuclear power reactors. Such help also led to the IAEA's use of "flow monitoring" at important nuclear installations in Japan and DPRK. POTAS help was in the form of both hardware and software.

POTAS also provided essential support for the development and use of tamper indicating seals. Most recently a field-readable, fiber-optics seal (COBRA) has been completed. The COBRA seal is now used in places where it can satisfy conditions better than the extensively used seals previously perfected by POTAS for normal conditions. An automatic, computer-based verifier to be used for verifying COBRA seals in the field is being developed by POTAS and will be ready for field tests in the middle of 1994.

In general, POTAS has been able to design equipment for both generic and specialized applications. This has involved both industry and DOE laboratories.

Systems studies

POTAS tasks for systems studies have assisted the IAEA in formulating generic safeguards approaches and then adapting them to facility-specific applications. This evolution corresponded to the IAEA's changing needs and permitted both generic and facility-specific problems to be addressed. At the same time, some problems which first arose in connection with specific facilities have been expanded into generic studies which treated the problems explicitly, systematically and more universally.

Important work which arose first for certain facilities and was then treated more systematically include: an analysis of diversion paths and development of model safeguards approaches for the facility type; explanatory notes and examples of how the State should complete the IAEA's design information questionnaire; guidelines for practical implementation of elements of the State's System of Accounting and Control (SSAC) at particular facilities; and calculations of the possible amounts of unreported plutonium which could be produced at specific reactors. The last two topics were greatly assisted by a CFE and by a consultant, respectively, provided by POTAS.

Important work on generic topics include: various studies on the possible extension of randomization to other applications in IAEA safeguards as part of efforts to reduce IAEA costs; development of methodologies for assessing and evaluating the effectiveness of IAEA safeguards; and strategic planning, including an associated plan for medium-term actions by the IAEA Department of Safeguards. The last two topics were greatly assisted by CFEs.

In addition, system studies support to inspectors for implementation of complex safeguards approaches at certain major facilities were greatly assisted by CFEs with a direct and important impact on the effectiveness of safeguards at these facilities.

Training

CFEs provided training at the IAEA in the use of NDA equipment, computers and gave other specialized training that has been essential for the success of the training of IAEA inspectors and other professional staff in the Department of Safeguards.

Training of IAEA staff in the U.S. on NDA equipment has been used extensively by the IAEA to ensure effective use of such equipment. This equipment is of major importance in safeguards performance at facilities handling bulk nuclear material. Twenty-seven training courses have been

arranged so far.

In addition, training about selected types of nuclear facilities has markedly affected preparations for effective safeguards performance at important facilities. For example, five training courses have been arranged by POTAS on enrichment technology.

In-field training on verification of a physical inventory (PIV) at selected types of facilities has greatly assisted the IAEA. A series of PIV training exercises were held under POTAS at U.S. facilities. The PIV exercises continue to be held at U.S. facilities, and one has recently been held at a European location. This progression is an excellent example of a POTAS effort stimulating assistance by other States, thereby increasing the cost-effectiveness of the U.S. program.

Annex 4 DESCRIPTION OF THE INTERNATIONAL SAFEGUARDS PROJECT OFFICE

The International Safeguards Project Office (ISPO), a Division of the Department of Advanced Technology at Brookhaven National Laboratory, provides technical management of the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS). POTAS is the main vehicle for provision of U.S. technical resources, via extra-budgetary U.S. contributions, to assist the IAEA Department of Safeguards in its mandate to assure the world community that nuclear materials placed under safeguards remain in peaceful use. Funding for POTAS is provided by the Department of State and is equal to approximately 10% of the annual budget of the Department of Safeguards.

ISPO provides day-to-day technical management of POTAS on behalf of the Technical Support Coordinating Committee (TSCC), an oversight group composed of representatives from four federal Agencies: the Department of State, the Department of Energy, the Arms Control and Disarmament Agency, and the Nuclear Regulatory Commission. The function of the committee is to provide policy guidance, overall program direction and to approve funding for each task that POTAS agrees to accept. An important additional role for ISPO is to provide technical advice on new initiatives that POTAS can undertake to enhance the effectiveness and efficiency of IAEA safeguards. All policy decisions on program direction and new initiatives are made by the TSCC: ISPO carries out those decisions.

Program Management

In the performance of its technical management role, ISPO ensures that requests for technical assistance to POTAS by the IAEA Department of Safeguards are competently evaluated for technical feasibility and that sound recommendations to meet the request are made to the TSCC for review and possible approval. After the TSCC has decided to fund a request, ISPO provides the technical oversight to ensure that the product that will be provided to the IAEA meets the IAEA's stated needs. If provision of experts to serve on the staff of the IAEA is approved by the TSCC, ISPO recruit qualified candidates. ISPO acts as the conduit for technical information between the IAEA Department of Safeguards and POTAS.

Since its inception in 1977, ISPO has provided technical oversight on over \$90 million of POTAS funds. During that time, over 400 tasks have been successfully completed and their products transferred to the IAEA Department of Safeguards. At present, ISPO is responsible for providing oversight on approximately 80 active projects, or tasks. These tasks cover a wide range of activities, including development and provision to examine alternative safeguards approaches and evaluation techniques, training courses and materials for safeguards staff, infrastructure support

in such areas as safety and management information, and identification and provision of approximately 20 experts in many disciplines to serve on the staff of the IAEA in Vienna for 2-5 year. In addition, when requested by TSCC, ISPO provides an independent technical analysis of projects or issues of interest to the TSCC.

Initiatives

In addition to its technical management activities, ISPO through POTAS has assisted the IAEA Department of Safeguards in defining and initiating programs to upgrade the support provided to Inspectors in the Operations Divisions. These initiatives have proven to be an important avenue of influence for POTAS to enhance the effectiveness and efficiency of international safeguards.

Some programs initiated by ISPO, supported by POTAS and adopted by the IAEA Department of Safeguards include: definition and support of an in-house inspector training program and establishment of a dedicated training section; organization of field exercises for inspectors to gain first-hand experience handling nuclear material; assistance in the definition and development of an infrastructure to handle equipment procurement, shipping, maintenance and repair; development of documented standard procedures across all Operations Divisions; introduction and training in quality assurance practices for development of safeguards equipment; procedures to facilitate procurement of equipment from commercial vendors; and orientation for U.S. citizens going to work in the IAEA Department of Safeguards.

Administration

In the course of providing technical project management of POTAS on behalf of the TSCC, ISPO carries out activities to ensure that the goals established by the TSCC for POTAS are met.

- For each IAEA request for assistance, ISPO prepares the following information: a task statement that reflects the problem identified in the request; a recommended technical approach to be pursued; the principal activities to be performed; major milestones and deliverables for the recommended approach; a proposed developer or expert; and estimated funding to perform the task activities.
- Once a year in response to the annual request for POTAS assistance from the Director General of the IAEA to the U.S. Resident Representative in Vienna, ISPO prepares the annual "TSCC Briefing Book". The Briefing Book contains ISPO's analysis and recommendations concerning all requests from the IAEA for technical assistance under POTAS. The Briefing Book also contains ISPO's

recommendations on additional funding requested for each currently active task. The TSCC uses the Briefing Book as the basis to consider each IAEA request and then decide whether to support it, to defer a decision, or to ask ISPO to provide additional information.

- When the TSCC has approved a request, ISPO arranges for any necessary interviews to select developers or experts to carry out the task activities.
- When the developer is selected, ISPO monitors implementation of each task and reports to the TSCC concerning progress (timeliness and substance) on milestones and deliverables.
- ISPO reviews foreign travel requests to ensure that these are consistent with approved task activities and recommends to DOE whether they should be approved.
- When a task is complete, ISPO formally transmits the results of each task to the IAEA as a POTAS report.
- As requested, ISPO prepares information on specific issues of technical interest to the TSCC.

Staff

The ISPO staff consists of five scientists, an administrative officer (half time only) and two secretaries. Of the five scientists, one is the Division Head who provides overall direction for ISPO in addition to performing task management functions. A second scientist, the Liaison Officer, is permanently based in Vienna, enjoys diplomatic status, and acts as a link between the IAEA Department of Safeguards and ISPO. The remaining three scientists serve as full-time task managers.

Annex 5 POSTULATED VERIFICATION ACTIVITIES BY OPCW UNDER THE CWC

Such activities are summarized in a report by ERDEC (EAI report 05/092/036F), according to various scenarios. These and other possibilities should be compared to verifications under the NPT in order to identify many of the similarities and differences of technical assistance to the OPCW which can be expected in comparison to POTAS.

The following activities are common to all scenarios:

- 1 Select/notify site;
- 2 Pre-inspection briefing;
- 3 Secure site as required;
- 4 Refine inspection plan;
- 5 Verify facility position;
- 6 Attempt to resolve anomalies;
- 7 Brief site personnel;
- 8 Prepare preliminary draft report;
- 9 Initial draft report;

The activities from the ERDEC report for each scenario are as follows:

Scenario One

- 1 Safety monitor;
- 2 Visual inspection of stocks;
- 3 Physical measurement of items;
- 4 100% count;
- 5 Record, confirm data;
- 6 Tag items for future chemical sampling;
- 7 Tag closed containers for opening;
- 8 Observe movement of tag items as necessary for further inspection;
- 9 Observe opening of tag containers;
- 10 Use NDE to investigate contents of tagged and other items;
- 11 Confirm contents;
- 12 Calculate facility quantity;
- 13 Investigate/resolve anomalies;
- 14 Seal inspected areas;

Scenario Two

- 15 Reconcile inventory transfers out of storage site and into destruction site;

Scenario Three

- 16 Engineering review;
- 17 Piping system verification;
- 18 Design a process monitoring system;
- 19 Install process monitoring system;
- 20 Determine normal process operating conditions;
- 21 Examine site layout;
- 22 100% count of items;
- 23 Visual and physical inspection of statistically sampled items in the unpack area;
- 24 Process monitoring from control room;
- 25 Process observation (walkthrough);
- 26 Process observation (CCTV);
- 27 Measure quantity of agent downloaded and destroyed;
- 28 Attend operational meeting;
- 29 Sample acquisition;
- 30 Witnessing sample acquisition;
- 31 Chain of custody;
- 32 Physical characteristics examination;
- 33 Sample analysis;

Scenarios Four and Five

- 34 Review records;
- 35 Inspect facility:
- 36 Perform inventory;
- 37 Install seals;
- 38 Verify integrity of seals;
- 39 Assess adequacy of process monitoring system;
- 40 Determine production capacity consistency;
- 41 Determine adequacy of closure plan;
- 42 Assess long term security aspects;
- 43 Secure facility:
- 44 Document inspection;
- 45 Observe selected items of specialized equipment visually;

- 46 Witness/observe item going through destruction;
- 47 Verify integrity of seals and monitoring system;
- 48 Observe destruction of building visually: on-site, periodic;

Scenario Six

- 49 Review of facility records;
- 50 Visually inspect declared SSSF;
- 51 Physical measurements;
- 52 Visual inspection;
- 53 Sampling and analysis;
- 54 Employee interviews;

Scenario Seven

- 55 Confirmation of declared purpose;
- 56 Assessment of Schedule 1 capability;
- 57 Check for Schedule 1 presence;
- 58 Assessment of capability;
- 59 Assessment of degree of risk (particularly during initial inspection);
- 60 Verification of production quantity;
- 61 Determination of production capacity;
- 62 Identify sample points;
- 63 Process sampling;
- 64 Classification testing;
- 65 Confirmation testing;

Scenario Eight*

- 66 Facility familiarization tour;
- 67 Visually verify site activities are consistent with the declaration;
- 68 Look for indicators of Schedule I production;
- 69 Visually assess capability of site to produce Schedule 1 chemicals;
- 70 Screen for Schedule 1 chemicals by use of detection equipment and/or classification test to verify absence of Schedule I chemicals;
- 71 Investigate/resolve anomalies by means of discussions with site officials and taking of samples for off-site analysis;

Scenario Ten* (and perhaps Nine)

- 72 Generally inspector activities parallel to those for stockpiles or production facilities, as applicable.

* In addition, for scenarios eight and ten, managed access is negotiated as part of the notification and preparation stage of the inspection. Similarly for scenario ten (and possibly nine)

the following activities are anticipated:

- 1 Witness declaration of non-CW;
- 2 Conduct sampling and analysis;
- 3 Record visual inspection photographically;
- 4 Interview site personnel.

Annex 6 KEY ISSUES IDENTIFIED IN A PREVIOUS REPORT

This Annex presents salient points from a summary of an early multi-DOE-laboratory study concerning IAEA safeguards experience and lessons learned applicable to CWC verifications. This report was based on a rolling draft of the Chemical Weapons Convention in 1990. It combines points pertinent to the negotiation of the Convention with those pertinent to implementation of a verification system pursuant to the Convention. An important product from the current effort sponsored by DNA will be an up-dated and more complete set of lessons learned along with identified similarities and differences with the OPCW.

The report identifies the following four factors that IAEA safeguards and CWC verification have in common:

1. Multinational
2. Administered by an international organization
3. Relies heavily on on-site inspection.
4. IAEA safeguard procedures address confidential information and intrusiveness.

The key differences were listed as:

1. Situations in which monitoring is required (e.g., destruction of existing chemical weapons)
2. Nature of the material processed.
3. Mutability of the materials to be verified.
4. Existing regulations and internal controls that apply in the two contexts.

The executive summary identifies 12 significant issues which range from broad policy to specific methods and technologies. The ordering of the twelve issues is from broad to detailed technical.

1. Technical effectiveness of verification must be balanced against political acceptability.

The historical evolution of IAEA safeguards has demonstrated that the success of such a verification system depends on striking an appropriate balance between conflicting goals: the technical effectiveness of the system on one hand and the wide political acceptability of the system on the other.

The need to balance reflects the fact that IAEA safeguards are essentially voluntary agreements. States accept NPT safeguards; they then have a right to participate fully in peaceful

nuclear activities. The IAEA cannot unilaterally impose safeguards measures that a number of States are unwilling to accept.

Acceptability of IAEA safeguards depends on a wide range of technical and political factors including:

- Equity considerations (including between nuclear weapon and non-nuclear weapon states). This principle of nondiscrimination is of paramount importance to many states and is likely to be as important for the CWC.
- Economic burdens of inspections, both for states and for facilities.
- Potential loss of sensitive information, including commercial and industrial secrets and other sensitive information (e.g., national security information).
- Potential safety hazards and third-party liability.
- The technical basis of the verification system. States generally prefer a disciplined, technically based system that has well-defined boundaries and limits.

IAEA experience shows it is possible to strike a balance. Systems of adequate controls of confidential information have been developed and work well.

Advances in technology need to be factored in, especially in estimating the economic and operational burdens. The technology improves, and these burdens decrease over time. The IAEA experience suggests that any assessment of technical effectiveness or acceptability should reflect an evolutionary perspective.

2. Concentration on a limited set of technically manageable verification tasks has been important.

IAEA safeguards exists within a framework to manage the risks of nuclear proliferation. Safeguards has a limited role, with relatively narrow set of technical tasks focused on the implementation of measures to detect the diversion of nuclear materials from declared peaceful uses. The IAEA cannot physically prevent diversion, protect against theft or sabotage, inquire into the intentions of states, blindly search for clandestine nuclear facilities, or collect information unrelated to its technical mission.

Concentration on a clearly defined technical mission has had a number of positive results:

1. Verification has technically manageable problems.
 2. Verification has not been politicized.
 3. The number of inspections has grown with increasing technical effectiveness.
 4. The technical objectives clearly support the broader policy goals.
3. IAEA experience with a dual mission (promotion and regulation) may be instructive to OPCW.

The IAEA has a dual mission: 1) promote peaceful uses of atomic energy 2) safeguard against military use. This give non-weapons States an incentive (peaceful use) to accept the safeguards. The CWC does not promote transfer of chemical technology, therefore this carrot is not there for accepting the verifications.

The IAEA experience suggests that a dual mission must be carefully weighed and designed. NPT distinguishes between weapons and non-weapons states; CWC says all states will destroy and give up CW, therefore this is fundamentally different, and it may be important in winning acceptance.

Note: There is a sort of dual mission that needs to be considered -- monitoring of destruction and verification of non-production of CW.

4. Flexibility is needed in the implementation of verification measures.

IAEA safeguards have evolved significantly over the years as new technologies have become available, as new treaties and agreements have been concluded, and as the safeguards program and the nuclear industry have expanded. In general the evolution has been positive, although some non-uniformity of verification procedures has developed over time.

5. Methods devised by the IAEA to take maximum advantage of limited resources may be useful to the OPCW (e.g., risk based procedures, efficiency, effective use of the off budget technical support.

The amount of material. number of facilities continues to grow. The tension between effectiveness and intrusiveness is also likely to be a major issue for the OPCW. One area is the budget process. The IAEA experience has been that high expectations for safeguards effectiveness are not always reflected in the budget, and that other, non-safeguards missions compete for the same limited funds.

IAEA experience suggests three ways of coping with resource limitations:

1. Set priorities and allocate resources accordingly. IAEA concentrates on nuclear material accounting. This cannot be directly applied under CWC, but a similar risk based approach could be developed for CWC.
 2. Improve efficiency
 - a. field offices, reduced traveling
 - b. increased computerization
 - c. more effective scheduling
 3. Obtain resources off-budget, directly from states. A disadvantage of this method is that these indirect sources of support are outside the direct control of the IAEA and could potentially be withdrawn at any time. However, the IAEA has managed to cope with this uncertainty and derive substantial benefits from indirect, off-budget sources of support. It also permits the U.S. to influence developments without seeking approval of IAEA Board of Governors.
6. IAEA experience underscores the importance of effective technical support to the inspectorate (e.g., technical support programs of the member states.)

As the IAEA safeguards program has evolved, there has been a continuing need to develop and deploy a wide range of sophisticated technologies. Technological change in safeguards has also been driven by rapid technical advances in computers, electronics, video equipment, and other fields.

Although IAEA has done some R&D work in house, the majority of its technology has come from technical support programs, 15 such programs currently exist. Work consists of developing and delivering equipment, training of inspectors, and "cost-free experts". The technical support program from 13 States supplement the regular budget of IAEA safeguards program by about 20%.

On the technical side, use of support programs facilitates access to a world wide pool of expertise, nuclear facilities, and technology that is far superior to what could be maintained in-house with any reasonable budget.

Lessons learned from technical support programs:

1. Technical support programs exert substantial influence over the safeguards program by choosing to support certain technologies and activities.
2. Member states must be willing to direct their efforts toward satisfying the IAEA's requirements.
3. Both the IAEA and the technology developer must follow a disciplined approach to

the development of new technology, including a strict adherence to an agreed set of procedures to ensure high quality and reliability under sometimes adverse field operations.

7. National Implementation measures have a major impact on verification effectiveness and efficiency.

The IAEA experience underscores the importance of "national implementation measures" as they are called in CWC; the corresponding term in the IAEA context is the "State System of Accounting and Control".

The SSAC has a number of domestic functions (protection against theft and sabotage), but also fulfills two key functions for IAEA safeguards:

1. It maintains a comprehensive system of accounting and control that serves as a foundation for IAEA verification. The IAEA independently verifies the information and findings of the SSAC, rather than performing all the actions necessary for a complete accounting system of its own.
2. The SSAC serves as the interface between the IAEA and the facilities that are inspected. This can have both positive and negative effects.

How well the SSAC performs these functions has a major impact on the effectiveness and efficiency of IAEA safeguards.

The IAEA experience has been that SSACs vary widely in their technical effectiveness and degree of cooperation. Because shortcomings in SSACs hamper effectiveness, member states have pursued initiatives to improve SSACs. Measures to improve technical effectiveness of the SSACs include the development of guidelines and good practices, international training courses, bilateral discussions and exchanges, advisory groups, and joint technical efforts by the IAEA and States. Improving the quality, consistency, and timeliness of reports is an example of a topic that has required considerable attention and that will also be important for the OPCW.

8. Materials accounting has limitations as a verification measures in the chemical context (alternatives include automatic on-line measurement systems, extensive use of containment and surveillance, and more extensive use of short notice random inspections.)

Materials accounting for large chemical facilities, while possible in theory, would be overly expensive and intrusive. However, certain approaches developed by the IAEA for verification at

large bulk-processing facilities may be applicable. These include:

1. In-line measurement systems. This is more attractive for new facilities, as opposed to retrofitting existing facilities.
 2. More extensive of containment and surveillance. This is more suited for safeguarding discrete items, as opposed to bulk quantities. Again, this is more feasible if it can be designed into facilities.
 3. Short notice random inspections.
9. Staffing the international inspectorate is a major challenge.

The recruiting and training of inspectors is a long and involved process, complicated by the international nature of the program. Political factors will also enter into the appointments to management posts.

In the IAEA, training of new inspectors has been formalized in recent years, with a series of core courses offered during the first months on the job. A systematic approach to training, as opposed to on-the-job training and the occasional course, will be important to the OPCW.

In addition to learning the technical requirements of the job, new inspectors face a variety of nontechnical challenges, including coping with foreign languages, adjusting to a different culture, and even handling financial matters such as taxes and banking.

There is also a potential problem that some States may reject a person to be designated to perform inspections in the State.

10. The IAEA experience indicates the importance of systematic evaluation and reporting of verification effectiveness.

A credible verification system must include provisions for evaluating its own effectiveness and reporting the results to interested parties. At first this was done informally, but is now a strong internal function, with an annual report called the Safeguards Implementation Report. The report presents information on overall results of safeguards, the attainment (or non attainment) of goals, problems encountered in safeguard implementation, and progress in addressing the problems.

A systematic evaluation and reporting function is important for at least two reasons:

1. It establishes an explicit mechanism for identifying needed improvement in the verification system.

2. It communicates to interested parties the accomplishments and limitations of the system.

There are inherent difficulties in establishing a strong evaluation and reporting function in a multinational verification organization, e.g., conflicting demand between confidentiality and candor, and transparency to outside organizations. Considering the rapid growth expected in the CWC, early attention to this issue is important.

11. Measurement control and measurement quality assurance are essential to the credibility of verification.

Independent measurements by IAEA inspectors are the cornerstone of the IAEA safeguards program. If safeguards are to be credible, the measurements must be valid and, equally important, their validity demonstrable. This requires a systematic quality assurance effort for all measurements performed by inspectors, and also by plant operators whose data are being verified. QA/QC of measurements was well developed for nuclear materials because of strategic and monetary value of material. These standards were required as part of the SSAC.

Although the OPCW may not rely on material accounting to the same extent as the IAEA, it will rely on measurement. Many of the concepts and techniques of measurement quality assurance are generic. The starting point for the OPCW should be the extensive work on measurement methods that has been done over the years by military organizations engaged on research on chemical agents. Environmental measurements will be applicable also

The principal lesson of the IAEA experience is to reinforce the importance and the difficulty of assuring measurement quality.

12. Much of the equipment, techniques, concepts and procedures widely used in IAEA safeguards can be adapted to CWC verification.

Although the verification approaches for the CWC may be different from those used by the IAEA, much of the equipment, techniques, concepts and procedures can be adapted to CWC verification. Examples are:

- Seals. Several of the seals that are used in IAEA safeguards could be adapted for a variety of chemical applications, for example, monitoring of weapons stockpiles, monitoring of shipments of chemical weapons from storage to destruction facilities, sealing of transportation containers for inspection samples, sealing of instrument cabinets and enclosures, and verification on nonproduction in former chemical weapons plants.

- Closed-circuit television (CCTV) surveillance. Surveillance systems similar to those used in IAEA safeguards could be applied as one part of a system to verify destruction of chemical weapons, to confirm nonproduction of chemical weapons at shutdown production facilities, or to monitor stockpiles
- Statistical sampling techniques. The IAEA has made extensive use of statistical sampling plans to conserve inspection resources. Similar techniques can be used throughout the CWC verification system, although in general they need to be tailored to each specific application.
- The concept of strategic points. The NPT uses the concept of strategic points as a mechanism for managing access to facilities, thereby addressing concerns about controlling the loss of sensitive information. The IAEA selects locations during examination of design information. Application of this concept has made it possible to negotiate workable limits on inspection access without compromising the effectiveness of safeguards.
- Specification of quantitative technical objectives. The IAEA has expressed its technical objectives in terms of the probability of timely detection of any significant noncompliance and the deterrence of noncompliance through the risk of early detection. Although CWC verification is based on different requirements, the concept of timely detection of my significant noncompliance seems applicable if adapted and implemented appropriately.
- A central analytical laboratory, supported by a network of analytical laboratories. The IAEA maintains its own central Safeguards Analytical Laboratory, located near IAEA headquarters, which performs chemical and isotopic analyses of inspection samples. Analyses are also performed, under appropriate controls to ensure measurement quality and integrity, by a network of 18 analytical laboratories located in and operated by IAEA member states. This arrangement serves to distribute the workload and expand the pool of expertise available for safeguards measurements.
- Analytical methods for designing and evaluating verification approaches. The IAEA has developed a number of systematic verification planning and analysis techniques that can be adapted for CWC verification system analysis. The techniques, which are all closely related, include diversion-path analysis, safeguards-effectiveness assessment methodology, and probabilistic assessment of safeguards effectiveness.