

## CANADA

### Chemical Weapons Convention: Article VIII

#### FACTORS INVOLVED IN DETERMINING VERIFICATION INSPECTORATE PERSONNEL AND RESOURCE REQUIREMENTS

##### INTRODUCTION

Many papers submitted to the Conference on Disarmament have remarked on the need to consider in increasing detail the constitutional, organizational and operational aspects of the International Organization to be established to implement the Convention. The United Kingdom, most recently in CD/769, has pointed to the need to distinguish between the work that should be done by the Ad Hoc Committee and that which could be left to the Preparatory Commission. It also is desirable, even necessary, that as the negotiation enters its concluding phase, the parties to the negotiation develop a greater awareness of the organizational and resource implications of the responsibilities to be entrusted to the International Organization.

The rolling text in its existing language already projects substantial demands upon a notional Technical Secretariat and, within it, upon an International Inspectorate which would be required to perform a range of complex activities for verification purposes. The rolling text as yet remains notably imprecise on the activities of the International Inspectorate, saying only that "the International Inspectorate shall be part of the Technical Secretariat and carry out activities relating to the execution of international verification measures provided for in this Convention". A purpose of this paper is to conduct an initial probe into the quite daunting resource implications, both in terms of personnel and equipment, which underlie the general language of the rolling text. The paper attempts to build upon valuable papers previously submitted by others, e.g., the Netherlands, the United Kingdom, the United States of America and other contributions too numerous to mention.

The aim is to bring into focus the activities that verification provisions as currently set out in CD/782 will require of the International Inspectorate. These provisions will necessitate inter alia that it inspect and monitor stockpiles, chemical weapons destruction facilities, chemical weapons production facilities, and relevant segments of the civilian chemical industry in order to ensure that States Parties are fulfilling their obligations. From these various verification activities is derived an outline

sketch of related resource requirements, particularly the skills and types of personnel needed. This gives a preliminary basis for considering the resources necessary for this vital sub-organ of the Convention.

The resource requirements are impossible to quantify with precision at this stage; one clear implication, however, to emerge from this study is the need for extensive exchanges of relevant information and data among States Parties prior to the Convention's coming into force, as part of the negotiating process or during the Preparatory Commission phase, in order for the necessary combination of equipment and skilled personnel to be assembled and trained, and procedures devised, for effective verification from the start.

## 1.0 STUDY

The body under study is the International Inspectorate that will be responsible for carrying out the verification (and certain other) activities necessitated by the Articles of a Chemical Weapons Convention. CD/782 Appendix I, the current draft text, provides the starting point in that the verification needs of the Convention are indicated in various Articles.

### 1.1 Articles which demand Verification of Compliance CD/782 Appendix I

#### III. Declarations

#### IV. Chemical Weapons

#### V. Chemical Weapons Production Facilities

#### VI. Activities not Prohibited

#### IX. Consultation, Co-operation and Fact-finding.

The activities required of the International Inspectorate can in the main be determined from the inspection requirements of these Articles. Provisions of Articles of the Convention will require separate verification functions along the lines listed below (challenge inspections may be viewed as a special case and there are no "fact-finding" provisions as yet; hence Article IX is not fully explored):

Chemical	Verification re:
Weapons Stockpiles	1 Declarations
Articles III, IV	2 Storage
	3 Destruction
	4 Transfers
	(5 Diversion)

CW Production	Verification re:
Facilities	1 Declarations
Articles III, V	2 Cessation of Production/Closure
	3 Destruction/Dismantling
	4 Temporary Conversion
	5 Transfers
	(6 Reconstruction)

Activities	Verification re:
not Prohibited	1 Declarations
Articles III, VI	2 Research and Development
	3 Permitted (Small-scale) Production
	4 Non-production (Civilian Production)
	5 Transfers

Various methods involved in verification, apart from National Technical Means, may be grouped under four main types:

- (1) Data Reporting
- (2) Verification by Inspection
- (3) Verification with Use of Instruments
- (4) Literature Analysis

## 1.2 Activities and Skills

The following sections, 1.2.1 and 1.2.2, list, in summary, the Inspectorate activities and skills required to implement and verify the CW Convention. The skills list closely parallels the activities list.

### 1.2.1 Activities

1. Data Collecting and Reporting
2. Performing Data Checks/Analyses
3. Conducting General Examinations of Facilities or Operations.
4. Conducting Interviews
5. Developing and Transmitting Questionnaires
6. Performing Material (Energy) Balances
7. Advising
8. Planning/Designing
9. Counting Items
10. Weighing Items
11. Obtaining Samples
12. Analysing Samples
13. Installing/Removing Instruments
14. Calibrating Instruments
15. Checking/Testing Instruments
16. Recording Readings
17. Monitoring Camera or Instrument Signals
18. Servicing Instruments
19. Supervising (State or Facility Personnel)
20. Inspecting at States Parties' Invitation
21. Analysing Relevant Literature.

### 1.2.2. Required Skills

This section relates the required Inspectorate skills to the specific activities listed in section 1.2.1. Each activity is listed in turn, as in section 1.2.1, and each is followed by a description of the relevant skills required. In some cases, where an activity entails different skills for different aspects, activities are elaborated, e.g., see point 2 "Performing Data Checks/Analyses".

1. Data Collecting and Reporting: Organizational and report-writing skills.
2. Performing Data Checks/Analyses (there are several aspects of this function, each with the skills noted):

To check Reports Against Plant Records: familiarity with the processes carried out in the plant; awareness of possibilities of diversion; ability to check safety records; knowledge of instruments and equipment.

To Verify Facility Status: ability to conduct a check against previous records for anomalies.

To Verify a Process Description: familiarity with process equipment, control and safety features in industry; awareness of possibilities of diversion within the process.

To Verify Chemicals (i.e., to verify reported movement and/or status):

- With respect to transfers/Imports/Exports: mathematician for material balance; see also "Plans" below.
- With Respect to Destruction/Production Facilities: ability to compare chemicals and quantities with the process and the purpose of the facility.

To approve plans:

- For Verification Systems: awareness of possible methods of diversion; familiarity with the processes in the case of destruction or production facilities; knowledge of instrumentation and equipment.
- For Storage Facilities: familiarity with the problems of storage of hazardous substances.
- For Destruction and Production Facilities: see "Process Description" above.
- For Transfers: awareness of restrictions to transfers; familiarity with the handling and transport of hazardous substances.

To Verify Utilities Requirements: knowledge of utilities requirements for various industries and processes.

To Verify Financial Reports: knowledge of costs of raw materials, production and products.

3. Conducting General Examinations of the Facilities or Operations: either a technical background as in 2 (see "Process Description") for on-site activities or technical and/or security background for monitoring duties; familiarity with safety precautions in dealing with hazardous chemicals.

4. Conducting Interviews: knowledge of the State language and interpersonal skills.
5. Developing and Transmitting Questionnaires: see 4.
6. Performing Material/Energy Balances: engineer or mathematician.
7. Advising: understanding of technical matters, e.g., process or instrumental design; knowledge of existing plans; awareness of possible methods of diversion and verification requirements.
8. Planning and Designing:
  - Facilities: skills as in 2 (see "Process Description") with a knowledge of optimization and cost engineering; experience in design of relevant facilities, e.g., production, destruction, or storage facilities.
  - Verification Systems: as in 2 (see "Process Description"); familiarity with computer design engineering and with instrumentation.
- 9 & 10 Counting/Weighing: analytical and mathematical skills.
- 11 & 12 Sampling: need appropriate sampling (and analytical) techniques for chemical, toxicological and medical sampling; knowledge of the hazards and necessary safety precautions involved with each class of chemicals.
- 13, 14 & 15 Installing, Calibrating, and Checking/Testing Instruments: skills of an electronics or computers technician.
- 16 & 17 Recording Readings from and Monitoring with Instruments: general knowledge of instrumentation and signal processing; familiarity with the system or process being monitored; knowledge of possible methods of diversion.
18. Servicing Instruments: technician with instrument or computer skills.
19. Supervising: good management skills; knowledge of all aspects of verification technology, inspection techniques and problems related to diversion.
20. Inspecting at States Parties' Invitation: any of those skills listed above depending upon the precise situation.
21. Analysing Relevant Literature:
  - To Aid in Compiling and Updating Chemical Lists: organizational skills and knowledge of chemistry and toxicology.
  - To Aid in Verifying Non-compliance Resulting from Clandestine Activities (e.g., by analysing trade records or reports): organizational skills and knowledge of CW chemicals, processes and equipment.

## 2.0 SKILLS, PERSONNEL AND RESOURCES REQUIRED

CD/387 and, to a greater extent, CD/445, present some estimates of the resources required by a Technical Secretariat in terms of personnel for inspections. Fixing the resource requirements in any greater detail is not possible at this stage. It is appropriate to re-state that the skills, personnel and resources needed for the Inspectorate will depend on its actual responsibilities, and its size will be related to the extent of its duties. The following factors, however, should determine the size of the Inspectorate, the size of technical support staff, and the associated costs.

### 2.1 Skills and Personnel

Personnel requirements can be derived from the detailed listing of skills developed in section 1.2.2. In the first place, engineers of various kinds, including chemical engineers, industrial engineers, and process engineers, will be necessary to advise on technical matters, to design verification methods, to check technical plans or reports, to inspect facilities or operations, and to train inspectors.

Second, to advise on technical matters, to aid in designing/supervising sampling systems and other verification methods, to conduct interviews, to compile and update chemical lists, and to check trade records or reports, the Inspectorate will need analytical and other chemists, toxicologists, industrial hygienists, and materials accounting specialists.

Third, technical support staff (as distinct from inspectors) should include interpreters, data specialists, computer and data communications engineers and technicians, electronics technicians, other instrumentation specialists, and laboratory technicians. An administrative group should include lawyers, accountants and secretaries (these might be in a separate section of the Technical Secretariat).

The first group (engineers), and the analytical chemists, toxicologists and industrial hygienists must either have extensive experience with the chemical industry, or undergo training in the speciality area in which they are to work.

An additional group that will have to be set up within the Inspectorate is a Quality Assurance Unit (QAU) of much larger size than the QAUs required in those countries that use "Good Laboratory Practice Regulations" (GLPs). That QAU could serve as an examination/certification board, and as an internal quality control monitor. Standard Operating Procedures will have to be written, and tailored and approved by the QAU, for many of the tasks to be performed.

It has also been suggested that a Scientific Council be created. In examining this proposal, consideration could be given to whether the responsibilities of such a body, should there be agreement on its establishment, might usefully include the regular review of the scientific criteria and methods employed by departments within the Inspectorate. This would provide yet another dimension of quality assurance, including maintenance of all activities at the current state-of-the-art.

### 2.1.1 Size of the Inspectorate

The number of inspectors required depends on:

- the number of facilities and operations to be inspected.

The greater the number of facilities to be inspected, the greater is the need for proportionately higher numbers of inspectors. The same holds true for transfers operations.

- the size and complexity of the facility or area requiring inspection.

"Size" refers to the physical size of an area and not to the process load of a facility. The greater the size or the more complex the facility and/or its processes, the greater will be the need for higher numbers of inspectors.

- the proximity of areas requiring inspection.

If such areas are close together and can be inspected jointly or in a single visit, then the burden in terms of numbers of inspectors is reduced.

- the duration of operations.

In the case of destruction operations, longer time-frames for operations generally necessitate more frequent inspections when inspections are random or periodic and necessitate more inspectors in any event. For transfer operations, longer time-frames for operations typically indicate that points of transfer are distant, that the transfer route is a slow one, or that the load to be transferred is large. Only in the last case are inspector numbers noticeably affected.

- the frequency of inspection.

If the frequency is made to be higher, then resource requirements become larger as well.

The choice of frequency of inspection is dependent, amongst other things, on:

- the duration of an operation;
- decisions to conduct familiarization visits;
- the type of facility or operation, i.e., classification according to chemicals;
- the level of risk of diversion within a facility or operation;

- the type of inspection or verification, i.e., the specific operations to be carried out.

The greater the number of duties assigned to the Inspectorate or the more complicated or time-consuming those activities are, the greater will be the required number of inspectors.

The choice of inspection type is dependent in turn on:

- the type of facility or operation, i.e., classification according to chemicals;
  - the level of risk of diversion within a facility or operation;
  - the applicability of employing instrumentation. Note that instruments may not be feasible where operations are of short duration;
  - obtaining a balance between the degree of effectiveness of the verification method and the degree of intrusiveness which results;
  - decisions to conduct inspections in stages of increasing intrusiveness and the likelihood that an inspection will be necessitated beyond a given stage for a given facility;
  - co-operation between the State and the Inspectorate at the levels of planning, advising, designing equipment, inspecting and compiling lists.
- the percentage of time spent travelling, report-writing, etc.

The greater the relative percentage of time devoted to inspecting, the smaller will be the size of the Inspectorate.

- training requirements.

A sub-organ will be responsible for training new personnel. (Personnel in charge of training programmes will be qualified inspectors.) The size of this sub-organ will be dependent on the details of training programmes, including their durations and frequencies. If training programmes are long, "back-up inspectors" may be incorporated into the Inspectorate in anticipation of future turnovers.

- requirements for challenge inspections.

These requirements cannot be readily determined before a Convention is in force. Expectations are that the effect of challenge inspections on the resources required will be relatively small. Certainly, if a decision is made to set up a permanent sub-organ within the Inspectorate for purposes of challenge inspections, then the impact on resources can be better estimated.



- cost considerations.

Budgetary constraints may have an impact on the operational capabilities of the Inspectorate.

### 2.1.2 Size of a Technical Support Staff

The size of technical support staff depends on:

- the form of data management chosen.

Data management may be of a very simple nature, involving a large amount of paperwork; or it may be of a highly technical nature, involving electrical, optical, or advanced (satellite) communication links from various sites to one or more designated centres; or it may be of an intermediate nature, e.g., involving data storage at various sites and subsequent transfer of these data. An appropriate balance between the numbers of highly-skilled technicians and the numbers of less-skilled members of the technical support staff will be dependent on the form of data management chosen.

- the types and amounts of instrumentation or equipment employed in the verification methods.

Any Inspectorate equipment or instrumentation should be installed, calibrated, checked, serviced, and removed by competent Inspectorate personnel. Technical support staff may also be required to assist in checking important facility equipment. The resource requirements will increase with increased complexity and use of instrumentation or equipment.

- the frequency of challenge inspections.
- the frequency of false alarms.

False alarms may occur with power failures or general equipment failure. Frequent false alarms may be reduced by utilizing back-up power generators and equipment or instrumentation.

- the use of laboratories for analysis of samples.

Laboratory technicians may be required if it is decided to set up one or more central laboratories for sample analyses.

- the degree of Inspectorate involvement in planning and designing facilities/equipment and/or verification schemes.

Details of equipment and instrumentation design, as well as details on their incorporation into plans, would require the involvement of technical support personnel.

### 2.1.3 Associated Costs

These will depend on:

- the number of inspectors employed (see 2.1.1).

This number will be in a state of general flux, dependent, inter alia, on the numbers of personnel in training at any given time. More importantly, it is generally expected to be at its highest value in the period immediately following the Convention's coming into force; as destruction operations are completed, the number should drop and eventually (after ten years) level off.

- the types of inspectors employed.

For example, if inspections are on a non-continuous basis, then personnel with broad expertise in the chemical industry will be needed; this would increase average salary levels within the Inspectorate, although it would probably decrease training costs.

- the size of the technical support staff (see 2.1.2).

Again, this will be greatest in the period following the Convention's coming into force, when the design of verification schemes and the installation of new equipment are expected to be key activities. As destruction operations are completed, staff numbers may decrease.

- the amounts and types of Inspectorate instrumentation and equipment required for verification purposes.

Instrumentation not under continuous control by the Inspectorate should be tamper-resistant, reliable and long-lived. To decrease the chances of false alarms, back-up generators and back-up equipment and instrumentation may be installed. Equipment for the purposes of investigation of allegations of use would also be needed, e.g., perhaps a portable "package" consisting of some vehicle loaded with appropriate equipment.

- the form of data management utilized.

The most efficient forms of data management are also the most costly, both in terms of capital costs and equipment upkeep, since they generally involve sophisticated computer equipment and communication links. The operating advantages of modern systems, which are capable of processing large amounts of information both rapidly and securely, may offset cost disadvantages. The need to provide for security of data will involve some additional costs.

- the size of the administrative support.

This is expected to be proportionately related to the size of the Inspectorate.

- the locations of Inspectorate main offices.

These should be located centrally in relation to the sites of inspection. Regional offices may also be desirable.

- travel requirements.

Travel expenses may be minimized by an appropriate choice of office locations. The choice of inspection frequency obviously affects travel requirements.

- challenge inspection costs.

These costs may include the hiring of special personnel and/or laboratories in cases of allegations of use. The added resource requirements necessitated by the inspection of allegations of use will, it is to be hoped, be relatively small.

## 2.2 Sources of Highly Skilled Personnel

The initial volume of work for the Inspectorate, especially the QAU, is probably more readily underestimated than estimated, and serious thought will have to be given to three aspects:

(1) What will be the source of the initial cadre of experts, inspectors and members of the QAU?

(2) What are the attractions for a highly qualified, well established person, to enter into a career with the Inspectorate, and to continue to be interested in doing what may amount to rather repetitive, boring and frustrating work?

(3) How does one ensure that the Inspectorate, and its key personnel, maintain a high level of scientific credibility and integrity?

Both the group of team-leading inspectors and the QAU will require highly skilled and experienced personnel. Currently, such persons are largely to be found in the chemical industry or in "leading-edge" research establishments. Ways and means have to be found to attract and retain the services of such persons. A main objective will be the eventual creation of an adequate career framework for a cadre of international civil servants. For training of young and aspiring prospective personnel, the Inspectorate could obtain the co-operation of universities and research institutions by arranging for training and fellowship positions. It may also be necessary in the initial stages to obtain the services of personnel with the required skills on a temporary basis by way of agreements between the Inspectorate, the primary employer, and the employee, providing for temporary leaves of absence with appropriate compensation. Industry and research institutions could profit from the enhanced reputation and visibility, and from the considerable knowledge gained by the specialists, once they return to the home institution. Such an approach, however, could have potentially serious implications in terms of adequately ensuring the confidentiality of information and data. This aspect would require careful scrutiny.

### 2.2.1 Maintenance of Scientific Credibility and Professional Status

Many of the key professionals required will have to maintain their research careers, for instance by publication of scientific papers. The regular work of the Inspectorate may provide opportunities for such activities so necessary to retain able specialists.

While it is recognized that the Inspectorate's primary purpose will be verification, it could also perform secondary activities that could advance and exploit skills similar to those needed for it, provided that they did not interfere with this purpose. For example, the organization might, if requested, assist States Parties in various ways, e.g., in reviewing safety and environmental protection aspects of their chemical industry activities. By performing such secondary roles the Inspectorate would acquire useful experience; foster positive attitudes toward it on the part of Governments and industry; and have the chance continually to test the functional/organizational ability of all associated laboratories, scientists, and supporting structures.