Fifteenth special session
Item 12 of the provisional agenda*

ASSESSMENT OF DEVELOPMENTS AND TRENDS, INCLUDING QUALITATIVE
AND QUANTITATIVE ASPECTS, RELEVANT TO THE DISARMAMENT PROCESS,
WITH A VIEW TO THE ELABORATION OF APPROPRIATE CONCRETE AND
PRACTICAL MEASURES AND, IF NECESSARY, ADDITIONAL PRINCIPLES,
TAKING DUE INTO ACCOUNT THE PRINCIPLES AND PRIORITIES
ESTABLISHED IN THE FINAL DOCUMENT OF THE TENTH SPECIAL
SESSION OF THE GENERAL ASSEMBLY, THE FIRST SPECIAL SESSION
DEVOTED TO DISARMAMENT

Letter dated 20 May 1988 from the Permanent Representative of Norway
to the United Nations addressed to the Secretary-General

I have the honour to transmit to you annexed to this letter a memorandum on
procedures for verification of alleged use of chemical weapons.

I should be grateful if you would arrange to have this letter and its annex
distributed as a document of the fifteenth special session of the General Assembly
under item 12 of its provisional agenda.

(Signed) Tom VRAALSEN
Ambassador
Permanent Representative of Norway
to the United Nations

* A/S-15/10.
ANNEX

Memorandum submitted by Norway on procedures for verification of alleged use of chemical weapons

1. Introduction

In view of the recent reports on the use of chemical weapons and in light of the increased danger of further proliferation of such weapons, a world-wide, comprehensive and effectively verifiable ban on chemical weapons is urgently needed. Against this background, the negotiations in the Conference on Disarmament on a convention on the prohibition of the development, production, stockpiling, transfer and use of chemical weapons and on their destruction are of vital importance.

The Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (the Geneva Protocol of 1925) contains no verification provisions. For that reason, an understanding has been reached in the Conference on Disarmament to incorporate a prohibition of the use of chemical weapons in the new convention.

In the absence of a global, comprehensive and effectively verifiable convention, General Assembly resolution 42/37 C to uphold the authority of the 1925 Geneva Protocol and to support the conclusion of a chemical weapons convention is very useful. It includes a request to the Secretary-General to carry out investigations in response to reports that may be brought to his attention by any Member State concerning the possible use of chemical and bacteriological (biological) or toxin weapons that may constitute a violation of the 1925 Geneva Protocol or other relevant rules of customary international law in order to ascertain the facts of the matter and to report promptly the results of any such investigation to all Member States.

2. The work of Norway in the development of procedures for verification of the alleged use of chemical weapons

As a contribution to the negotiations in the Conference on Disarmament on the chemical weapons convention, the Norwegian Ministry of Foreign Affairs initiated in 1981 a research programme on verification of alleged use of chemical weapons. Based on this research programme, which is carried out by the Norwegian Defence Research Establishment, several documents have been submitted to the Conference on Disarmament. These documents are included in the publication Contributions by Norway to the Conference on Disarmament 1982-1987, which is available at the third special session of the General Assembly devoted to disarmament.

As regards procedures for verification of the alleged use of chemical weapons to be included in the convention itself, attention is drawn to document CD/766 of 2 July 1987, which draws on research conducted separately by Canada and Norway. This is a proposal for an annex to article IX of the chemical weapons convention, submitted jointly by Canada and Norway to the Conference on Disarmament (see the special report of the Conference on Disarmament (A/S-15/2)).
The Norwegian research programme on the development of a complete procedure for verification of the alleged use of chemical weapons is undertaken on the basis of field experiments in order to make sure that the findings have as realistic a basis as possible. The programme focuses on a series of elements such as the time factor, meteorological conditions, composition of an inspection team, equipment for the inspection team, methods for identifying an alleged contaminated area, composition of a complete field laboratory, sample handling, transport of samples and analysis in laboratories.

Although the Norwegian research programme concerns verification of the alleged use of chemical warfare agents, several elements of the procedure can be used in the verification of other parts of the chemical weapons convention, such as on-site inspection on challenge, destruction of stocks and non-production.

Outlined below is a brief description of the main elements of this verification procedure, elaborated on the basis of the Norwegian research.

3. The verification procedure

The time element

Based on studies of the persistence of various chemical warfare agents under different meteorological conditions, it can be concluded that the inspection of an alleged use should take place within 48 hours after a request has been received. The international inspectors should present their findings in a report within 10 days after their on-site investigation.

The persistency of agents and therefore the success of verification depend both on the physical characteristics of the agent and on the meteorological conditions in the region, in particular temperature, wind speed and humidity. The research programme has therefore particularly addressed the meteorological factors. In general, it may be stated that high temperature and high wind speed decrease the persistency of agents in the field. High humidity combined with high temperature increases the rate of hydrolysis of the agents.

During the research programme different groups of warfare agents, such as nerve agents, mustards, incapacitating agents and toxins have been investigated. Persistent nerve agents, such as VX and soman, and incapacitating agents, such as adamsite, Clark I and II, can be detected even after two weeks exposure under summer conditions and after four weeks under winter conditions. Other nerve agents, such as sarin and tabun, could be detected with difficulties after one week exposure under summer conditions and after two weeks under winter conditions. For these agents, however, the breakdown products could be detected in the field for several weeks and could be used as a means of verification. Mustard agent and lewisite in large quantities could be detected for several weeks, but in small droplets they were easily hydrolysed in aqueous solutions.

The composition of the inspection team

The international inspectors should have acquired experience in handling chemical agents. The team should consist of chemists for proper handling of
samples and medical personnel (forensic pathologist, toxicologist) for inspection of human and animal casualties. Explosive ordnance disposal (EOD) personnel are necessary to handle ammunition and weapon fragments.

In addition, the team should be assisted by interpreters to allow the team to make independent interviews and in some cases even by an anthropologist with adequate knowledge of the people living in the vicinity of the target area.

Equipment for the inspection team

There should be no restrictions on the international inspectors in bringing with them the necessary equipment, such as personal protective equipment, position finding equipment, and a mobile laboratory to perform field analysis and to collect samples for further investigation, as well as means for transport of the samples.

Inspection of the alleged contaminated area

Immediately upon arrival the international inspectors should have unimpeded access to the area of the alleged attack. They should without delay carry out a visual inspection of the area and identify any damage to terrain, vegetation and animals. The international inspectors should be granted the possibility of interviewing persons who have witnessed the alleged attack of chemical weapons. The team should also be permitted to conduct medical examinations of persons and animals that have been affected by the alleged attack.

The inspectors should collect an appropriate number of samples to cover the area and should also collect control samples to assure that the background does not interfere with the analysis of chemical agents. In order to illustrate the number of samples to be taken, a statistical analysis shows that with 20 samples from an area as large as 1 sq km the chances for positive verification are more than 80 per cent.

In addition to environmental samples from soil, sand, vegetation, snow and water, the inspectors should also collect biological and autopsy specimens, munition fragments or duds, which may be contaminated. Certain materials such as leather and polymers are good absorbents for chemicals and may contain high concentrations of chemical agents and thus be of particular use in analysis.

Field analysis

The international inspectors should, if possible, perform a preliminary field analysis by making use of available techniques, such as the Chemical Agent Monitor (CAM), detection paper and thin layer chromatography (TLC). Such field analysis can in addition provide an indication of the type of chemical agents used in the alleged attack. These techniques have already been successfully tested in several field trials during the Norwegian programme.

Sample handling

In order to transform the samples into a more convenient form for further transport and analysis, the international inspectors may carry out a preliminary
purification in the field. A method for such a purification has been developed in Norway. This method is based on the aqueous extraction of samples and subsequent absorption of chemical agents to porous polymers. These polymers are available in a form that facilitates purification, concentration and subsequent handling of samples.

It is important to code and document each sample and to establish a strict chain of custody of each sample, as well as to elaborate an accounting system for the samples. This record of the sample should be updated until the sample is analysed. The record of the international inspectors should be available for the analytical laboratory, but the coding of the samples should be kept separate.

**Transport**

The samples should be packed in a sealed stainless-steel container in order to avoid degradation or contamination during transport. Since most chemical agents are volatile and hydrolyse rather easily, the samples should be transported under cooled conditions, preferably in an insulated box with dry ice.

**Analysis in laboratories**

The samples should be analysed in at least two laboratories that are especially designated and certified. These laboratories must be in the possession of standardized analytical equipment, such as gas chromatographic and mass spectrometric instruments. The mass spectrometer, which gives a fingerprint of the chemical agent, should be the most important instrument. A conclusive proof should always be a mass spectrum of the verified chemical warfare agent. In addition to the mass spectrometer, the gas chromatograph should be equipped with a nitrogen-phosphorus and a flame photometric detector to increase selectivity for sulphur- and phosphorus-containing compounds.

**Reports of the inspection team and the laboratories**

The international inspectors should present the findings in a report to the technical secretariat within 10 days after the completion of their on-site inspection.

The results of the analysis of the laboratories should, if possible, be submitted to the technical secretariat within 72 hours after the arrival of the samples at the laboratories.