CONFERENCE ON DISARMAMENT

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LETTER DATED 16 DECEMBER 1987 FROM THE REPRESENTATIVE OF THE UNION OF SOVIET SOCIALIST REPUBLICS ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A WORKING PAPER ENTITLED "INFORMATION ON THE PRESENTATION AT THE SHIKHANY MILITARY FACILITY OF STANDARD CHEMICAL MUNITIONS AND OF TECHNOLOGY FOR THE DESTRUCTION OF CHEMICAL WEAPONS AT A MOBILE UNIT"

I have the honour to transmit herewith a USSR working paper entitled "Information on the presentation at the Shikhany military facility of standard chemical munitions and of technology for the destruction of chemical weapons at a mobile unit".

I should be grateful if you would take the necessary steps to circulate this information as an official document of the Conference on Disarmament.

(Signed) Y. Nazarkin
Ambassador
Permanent Representative of the
Union of Soviet Socialist Republics to
the Conference on Disarmament

UNION OF SOVIET SOCIALIST REPUBLICS

INFORMATION ON THE PRESENTATION AT THE SHIKHANY MILITARY FACILITY OF STANDARD CHEMICAL MUNITIONS AND OF TECHNOLOGY FOR THE DESTRUCTION OF CHEMICAL WEAPONS AT A MOBILE UNIT

(Working paper)

1987

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Description of the presentation

In the Conference on Disarmament, on 6 August 1987, the Soviet side, in order to build an atmosphere of trust, and with a view to the early conclusion of an international convention on the complete prohibition of chemical weapons and the elimination of stockpiles thereof, invited participants in the chemical weapons negotiations to visit the Soviet military facility at Shikhany to acquaint themselves with standard chemical munitions and with a technology for the destruction of chemical weapons at a mobile unit.

The presentation was scheduled for 3 and 4 October 1987.

Invitations to the presentation were issued to the representatives of 51 States participating in the negotiations in the Conference on Disarmament. The programme is attached.

In total, the presentation was attended by more than 130 persons from 45 States, including 15 heads of delegations to the Conference on Disarmament, 2 representatives of the United Nations Secretariat, as well as military specialists, experts and advisers.

The presentation was covered by 56 representatives of the mass media, including 20 from foreign countries.

In inviting participants in the negotiations on a chemical weapons ban to visit the Shikhany military facility, the Soviet side was guided by the interests of a full, effective and verifiable ban on chemical weapons and by its desire to contribute in all possible ways to strengthening an atmosphere of trust in the negotiations. The presentation was a concrete manifestation of the Soviet Union's new approach to the solution of international problems.

Together with the proposals aimed at agreement without delay on a convention banning chemical weapons which the Soviet Union has put forward in the negotiations, and with other acts such as the halting of the manufacture of chemical weapons by the Soviet Union, the presentation at Shikhany pursued the goal of showing readiness to conclude an international convention on such weapons.

Those attending the presentation were flown from Moscow to a military airfield near the Shikhany facility in Aeroflot aircraft.

They were welcomed to the Shikhany facility by Colonel-General V.K. Pikalov, Commander of Chemical Warfare Troops of the USSR Ministry of Defence, in the facility's club (text attached).

The Commander of the Shikhany facility, Major-General R.F. Razuvanov, described to them the layout and the main zones of the facility, and the purposes for which they are used (text and sketch map of the facility attached).

During the presentation of standard chemical munitions, the participants were presented with four reports concerning chemical artillery munitions, chemical warheads for tactical missiles, air-launched chemical munitions, and chemical agents for close combat (texts of the reports and diagrams of the standard munitions, with combat characteristics, attached).

A total of 19 standard chemical munitions were displayed: 10 types of munitions for tube and rocket artillery; 2 warheads for tactical missiles; 6 types of aerial bomb and spray tank; and 1 type of munition, a chemical hand-grenade, for close combat.

For each type of munition the participants were informed of its military purpose, its calibre, the name of the CW agent with which it was filled, the method of dispersion of the agent, the type of fuse and the type of explosive, the weight of the projectile and the weight of the CW agent, the filling coefficient, and the materials from which the projectile was made.

Staff at the facility submitted a report on "The Soviet Army's chemical warfare agents" (text attached).

The report sets out the physical and chemical characteristics of blister agents, nerve agents and lung irritants, including the agents' chemical formula, molecular weight, physical state, boiling and freezing points, density, volatility, viscosity, surface tension, heat capacity, latent heat of evaporation and diffusion co-efficient. It also gives the agents' toxicity characteristics.

Those attending the presentation also heard a report on "Standard methods for determining the toxicity of CW agents" (text attached).

The report proposed a method for the categorization of super-toxic lethal chemicals that could be used in elaborating appropriate methods for inclusion in a convention.

As regards the technology for the destruction of chemical weapons, those attending the presentation were shown a mobile chemical weapon destruction unit and given an opportunity to thoroughly examine each of the machines comprising the unit as well as to acquaint themselves with their technical characteristics. They were informed of the purpose of the unit, its composition, process path, deployment time, staffing and energy supply requirements, weight and power specifications.

These points were dealt with in four reports by specialists on:

The purpose, design specifications and principles for use of the mobile chemical weapon destruction unit;

The technology for the destruction of chemical munitions at the mobile unit;

Safety arrangements during the destruction of chemical munitions at the mobile unit and their application;

Verification of the completeness of the destruction of chemical weapons at the mobile unit, and environmental protection measures.

Copies of these reports are attached.

The actual process of destruction of chemical munitions was demonstrated at the Shikhany facility's proving ground through the destruction of a 250-kilogram aerial bomb filled with the CW agent sarin.

Those present were able to observe the main stages in the destruction of a chemical weapon, such as the opening of the munition casing, the evacuation of the chemical warfare agent into a reactor, the thermochemical reaction of the destruction of the agent, and the thermal decomposition of the products of the decontamination. Work with actual chemical warfare agents was confirmed by biological experiments on animals.

In the course of the demonstration of the chemical weapon destruction technology, methods of verifying the completeness of destruction of CW agents were extensively presented, as were safety measures.

Since the technology for the destruction of chemical weapons at a mobile unit requires the use of personal protective equipment, those members of delegations who wished to acquaint themselves with the destruction process in greater detail were provided with such equipment in accordance with the safety regulations, and the equipment underwent technical testing. The time for which the equipment was worn depended on each individual's wish to observe the process of chemical weapon destruction directly. In this regard, instructions were provided on the rules for the use of protective equipment (text attached).

The members of delegations and reporters attending the presentation were able to film and take photographs as well as to make sound recordings on all the routes covered and throughout the visit.

Following the presentation of the standard chemical munitions, a briefing was held on board the Yuri Andropov, at which a speech was made by Lieutenant-General A.D. Kuntsevich, a leading expert from the USSR Ministry of Defence and the USSR Academy of Sciences. In the course of the briefing, Ambassador Y.K. Nazarkin, the Soviet representative to the Conference on Disarmament, Lieutenant-General Kuntsevich, and Major-General R.F. Razuvanov, Commander of the Shikhany military facility, answered numerous questions relating to the presentation.

On 5 October, a press conference on the results of the foreign representatives' visit to the Shikhany military facility was held in Moscow, at the press centre of the USSR Ministry of Foreign Affairs.

Participating in it were: Colonel-General V.K. Pikalov, Commander of the Chemical Warfare Troops of the USSR Ministry of Defence; Ambassador V.P. Karpov, Head of the Arms Limitation and Disarmament Department of the USSR Ministry of Foreign Affairs; Ambassador Y.K. Nazarkin, USSR representative to the Conference on Disarmament; Ambassador Rolf Ekéus, Chairman of the Conference on Disarmament's Ad hoc Committee on Chemical Weapons and head of the Swedish delegation; Lieutenant-General A.D. Kuntsevich, a leading expert in the USSR Ministry of Defence and the USSR Academy of Sciences; and Ambassador G.I. Gerasimov, head of the Information Department of the USSR Ministry of Foreign Affairs.

The press conference was attended by over 350 people, including 80 foreign correspondents.

It was addressed by Colonel-General V.K. Pikalov, Commander of the Chemical Warfare Troops of the USSR Ministry of Defence.

Annex 1

Programme for the presentation to participants of standard chemical munitions and a technology for the destruction of chemical weapons at a mobile unit

1-2 October	Arrival in Moscow
3 October	
9 a.m.	Departure by air from Moscow
10-11 a.m.	Arrival at the Bagai-Baranovka military airfield and transfer to the site of the munitions presentation
11 a.m.-1 p.m.	Meeting with commanding officers of the Shikhany facility
1-3 p.m.	Presentation of standard chemical munitions
6-7 p.m.	Briefing
8-11 p.m.	Entertainment, boat trip
4 October	
9 a.m.	Transfer to the site of the demonstration of chemical weapon destruction technology
10 a.m.-1 p.m.	Demonstration of chemical weapon destruction technology
2-3 p.m.	Transfer to Bagai-Baranovka military airfield
3 p.m.	Departure by air for Moscow
5 p.m.	Arrival in Moscow
5 October	
10.30 a.m.	Press conference on the results of the trip at the press centre of the USSR Ministry of Foreign Affairs

Annex 2

Introductory statement by Colonel-General V.K. Pikalov, Commander, Chemical Warfare Troops, USSR Ministry of Defence

The Shikhany military facility, which you have accepted an invitation to visit, comes directly under the military administration of the Chemical Warfare Troops.

I have the honour to welcome you to the Volga region on behalf of the authorities of the Ministry of Defence and to wish you well.

I think there is no need to comment on the programme for the presentation, since it is well known. I should like to say just one thing: the programme will be carried out to the full, and is unprecedented for us.

Although the year has been marked by abnormal weather, Nature has tried to provide us with some sunshine, and I hope that these conditions will also extend to our meeting.

As the programme for the presentation is rather a full one, I would earnestly request you to defer all the questions that arise in the course of our work until the briefing that will be held on the boat today, or to put them at the press conference that will take place on 5 October, at 10 a.m., in the press centre of the USSR Ministry of Foreign Affairs in Moscow.

Annex 3

Statement by Major-General R.F. Razuvanov, Commander, Shikhany military facility

Permit me to welcome you to the Shikhany military facility on behalf of the officers and all our staff. You are the first foreigners to have entered its territory.

That being so, permit me to describe the facility briefly to you.

On the way here, you were given information about the Saratov region and the Volsk district in which the facility lies, and about the particular features of the area.

You are now in the facility's club, which is situated in the residential zone. Directly adjacent to this are the administrative zone, the laboratory and technical zone, the security and safety sub-unit zone, and the stores and ancillary services zones (figure 1).

The residential zone contains housing for our personnel, together with common services and recreational facilities.

The administrative zone contains the administrative buildings for the control and administration of the facility.

Located within the administrative zone are the main services such as materials and technical supply, finance, transport, engineering, meteorology, communications and other sub-units essential to the operation of the facility.

The laboratory and technical zone contains buildings, structures and laboratory blocks necessary for the fulfilment of the functions assigned to the facility.

Other tasks assigned to our facility include those relating to chemical weapons.

Today, on the way to the point where the standard chemical munitions will be presented, you will have an opportunity to pass through our residential zone, the administration zone and the laboratory and technical zone; commentaries will be provided by facility personnel.

After the presentation you will travel across the proving ground and beyond the perimeter of the Shikhany military facility's buffer zone to the edge of the River Volga, where a cruise ship will be waiting for you near the settlement of Belogorodnya.

Tomorrow you will again go by this route to the presentation site, where a demonstration will be given of a technology for the destruction of chemical weapons. Afterwards, you will go to the Bagai-Baranovka airfield, from where you will fly to Moscow.

I should like to say once again on behalf of our entire team that we fully support the efforts being made by our Party and Government in the sphere of disarmament and the elimination of all types of weapons of mass destruction, including chemical weapons, by the year 2000.

We are happy to welcome you as the representatives of world public opinion as a whole and its struggle for peace and the reduction of international tension.

We hope that the participants in the negotiations will make every effort to ensure that a convention on the prohibition of chemical weapons becomes a reality in the very near future.

We, for our part, are willing to assist in this and trust that the presentation at our facility will further the achievement of early agreement on the banning of chemical weapons and the elimination of stockpiles of such weapons.

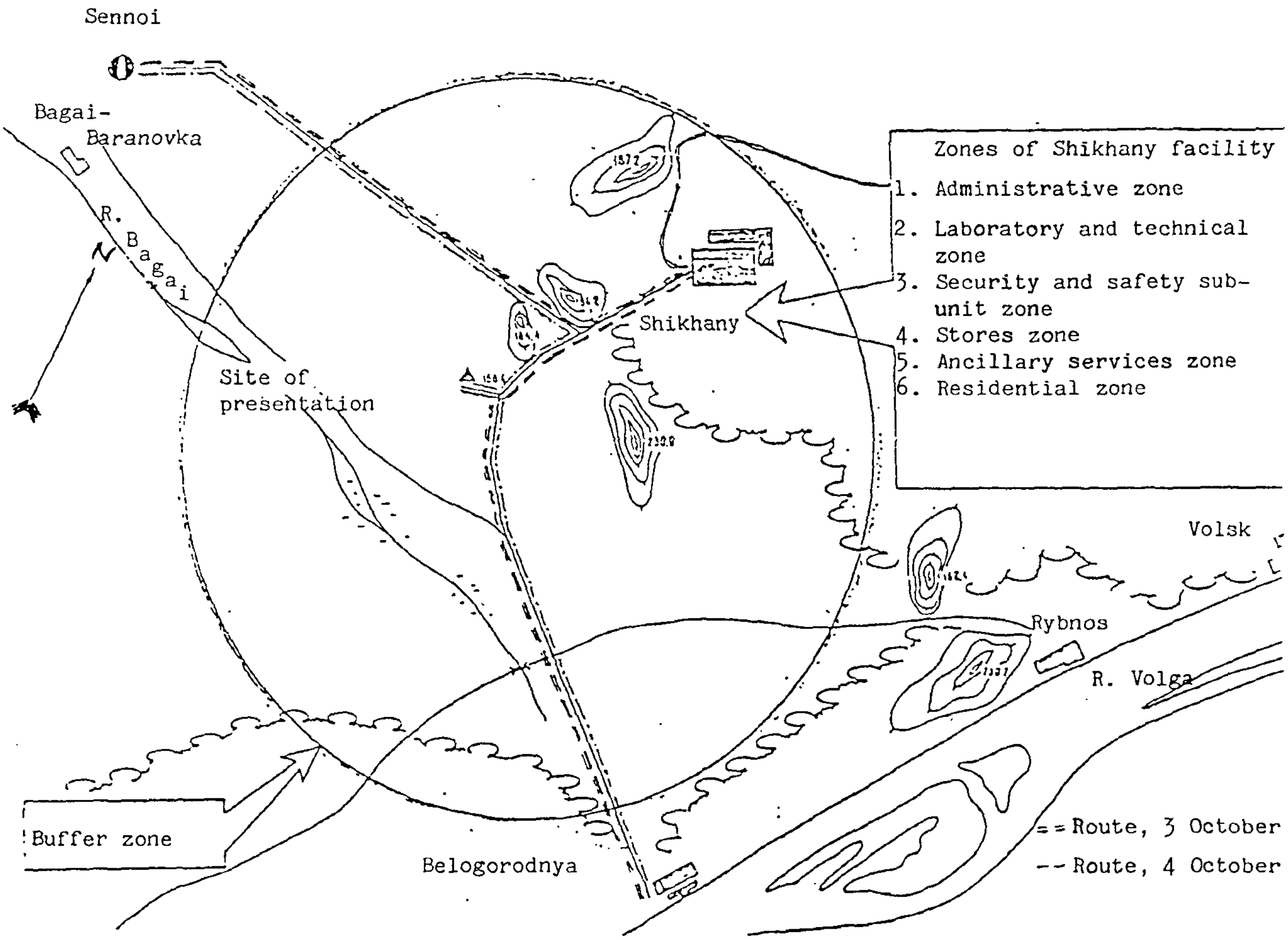


Fig. 1. Sketch map of the Shikhany military facility

Annex 4

Chemical artillery munitions

122-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 2).

Combat characteristics of the shell

The shell is designed to disable personnel through the respiratory organs.

The CW agent in the shell is sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - explosion of bursting charge. A percussion fuse is used in the shell.

Shell weight - 22.2 kg. Weight of sarin - 1.3 kg.

Filling coefficient - 0.06.

Explosive - TNT

Steel, copper and aluminium are used in shell construction.

152-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 3).

Combat characteristics of the shell

The shell is designed to disable personnel through the respiratory organs.

The CW agent in the shell is sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol.

Method of CW agent dispersion - explosion of bursting charge. A percussion fuse is used in the shell.

Shell weight - 40.0 kg. Weight of sarin - 2.8 kg.

Filling coefficient - 0.07.

Explosive - TNT

Steel, copper and aluminium are used in shell construction.

130-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 4).

Combat characteristics of the shell

The shell is designed to disable personnel through the respiratory organs.

CW agent in shell - sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - explosion of bursting charge. A percussion fuse is used in the shell.

Shell weight - 33.4 kg. Weight of sarin - 1.6 kg.

Filling coefficient - 0.05.

Explosive - TNT.

Steel, copper and aluminium are used in shell construction.

122-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 5).

Combat characteristics of the shell

The shell is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The CW agent in the shell is viscous lewisite. Combat condition of CW agent when used - vapour, aerosol and droplets. Method of CW agent dispersion - explosion of bursting charge. A time fuse is used in the shell.

Shell weight - 23.1 kg. Weight of viscous lewisite - 3.3 kg.

Filling coefficient - 0.14.

Explosive - TNT

Steel, copper and aluminium are used in shell construction.

152-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 6).

Combat characteristics of the shell

The shell is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate materiél, terrain and engineering structures.

The CW agent in the shell is viscous lewisite. Combat condition of CW agent when used - vapour, aerosol and droplets. Method of CW agent dispersion - explosion of bursting charge. A time fuse is used in the shell.

Shell weight - 42.5 kg. Weight of viscous lewisite - 5.4 kg.

Filling coefficient - 0.13.

Explosive - TNT.

Steel, copper and aluminium are used in shell construction.

130-mm chemical tube artillery shell

The shell consists of a casing with a filler hole, a burster tube, a bursting charge, a fuse and a CW agent (figure 7).

Combat characteristics of the shell

The shell is designed to disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The CW agent in the shell is VX. Combat condition of CW agent when used - dense aerosol and droplets. Method of CW agent dispersion - explosion of the bursting charge. A proximity fuse is used in the shell.

Shell weight - 33.4 kg. Weight of VX - 1.4 kg.

Filling coefficient - 0.04.

Explosive - TNT.

Steel, copper and aluminium are used in shell construction.

122-mm chemical rocket missile

The missile consists of a body with a filler hole, a primer tube, a bursting charge, a fuse and a CW agent (figure 8).

Combat characteristics of the missile

The missile is designed to disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The CW agent in the missile is VX. Combat condition of CW agent when used - dense aerosol and droplets.

Method of CW agent dispersion - explosion of bursting charge. A proximity fuse is used in the missile.

Weight of missile - 19.3 kg. Weight of VX - 2.9 kg.

Filling coefficient - 0.15.

Explosive - TNT.

Steel, copper and aluminium are used in missile construction.

122-mm chemical rocket missile

The missile consists of a body with a filler hole, a primer tube, a bursting charge, a fuse and a CW agent (figure 9).

Combat characteristics of the missile

The missile is designed to disable personnel through the respiratory organs.

The CW agent in the missile is sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - explosion of the bursting charge. A percussion fuse is used in the missile.

Weight of missile - 19.3 kg. Weight of sarin - 3.1 kg.

Filling coefficient - 0.16.

Explosive - TNT.

Steel, copper and aluminium are used in missile construction.

140-mm chemical rocket missile

The missile consists of a body with a filler hole, a primer tube, a bursting charge, a fuse and a CW agent (figure 10).

Combat characteristics of the missile

The missile is designed to disable personnel through the respiratory organs.

The CW agent in the missile is sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - explosion of the bursting charge. A percussion fuse is used in the missile.

Weight of the missile - 18.3 kg. Weight of sarin - 2.2 kg.

Filling coefficient - 0.12.

Explosive - TNT.

Steel, copper and aluminium are used in missile construction.

240-mm chemical rocket missile

The missile consists of a body with a filler hole, a primer tube, a bursting charge, a fuse and a CW agent (figure 11).

Combat characteristics of the missile

The missile is designed to disable personnel through the respiratory organs.

The CW agent in the missile is sarin. Combat condition of CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - explosion of the bursting charge. A percussion fuse is used in the missile.

Weight of the missile - 44.3 kg. Weight of sarin - 8.0 kg.

Filling coefficient - 0.18.

Explosive - TNT.

Steel, copper and aluminium are used in missile construction.

1. Casing

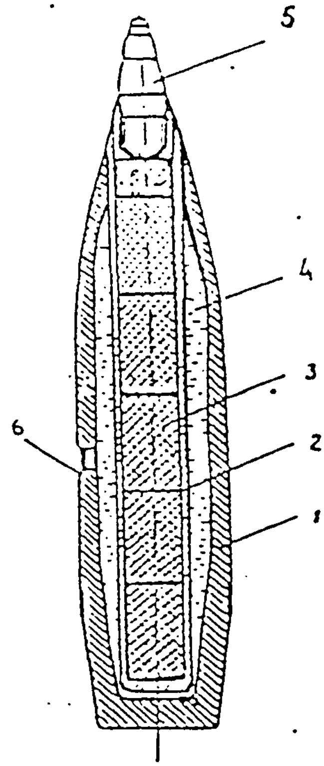
2. Burster tube

3. Bursting charge

4. CW agent

5. Fuse

6. Filler hole

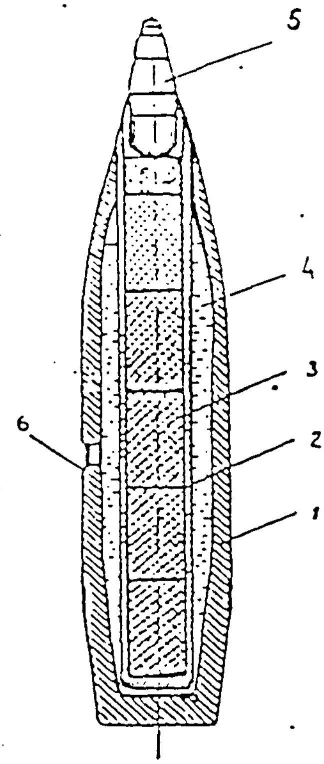


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	122 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of shell	22.2 kg
7.	Weight of CW agent	1.3 kg
8.	Filling coefficient	0.06
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 2. 122-mm chemical tube artillery shell

1. Casing
2. Burster tube
3. Bursting charge
4. CW agent
5. Fuse
6. Filler hole

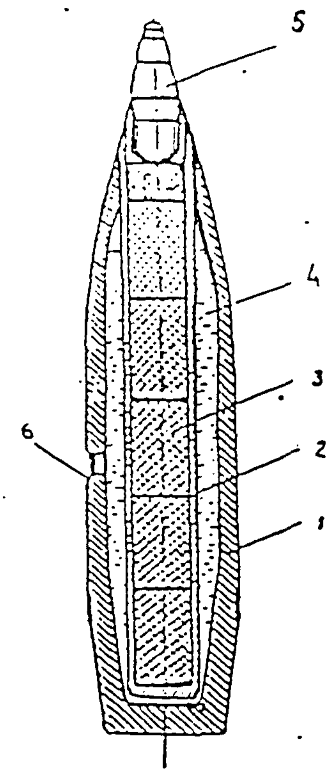


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	152 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of shell	40.0 kg
7.	Weight of CW agent	2.8 kg
8.	Filling coefficient	0.07
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 3. 152-mm chemical tube artillery shell

1. Casing
2. Burster tube
3. Bursting charge
4. CW agent
5. Fuse
6. Filler hole

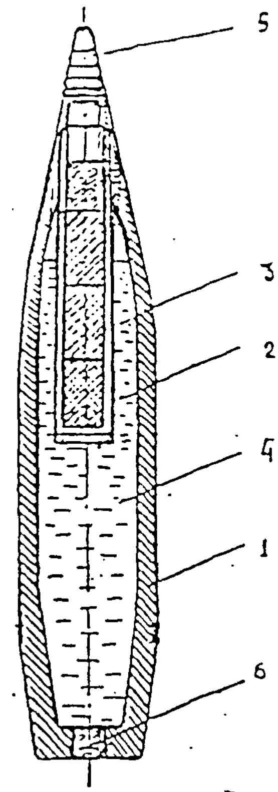


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	130 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of shell	33.4 kg
7.	Weight of CW agent	1.6 kg
8.	Filling coefficient	0.05
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 4. 130-mm chemical tube artillery shell

1. Casing
2. Burster tube
3. Bursting charge
4. CW agent
5. Fuse
6. Filler hole

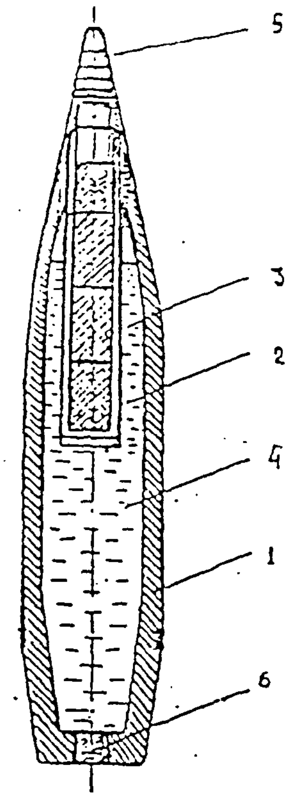


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin and to contaminate matériel, terrain and engineering structures
2.	Calibre	122 mm
3.	CW agent	
	Name	Viscous lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Time
6.	Weight of shell	23.1 kg
7.	Weight of CW agent	3.3 kg
8.	Filling coefficient	0.14
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 5. 122-mm chemical tube artillery shell

1. Casing
2. Burster tube
3. Bursting charge
4. CW agent
5. Fuse
6. Filler hole

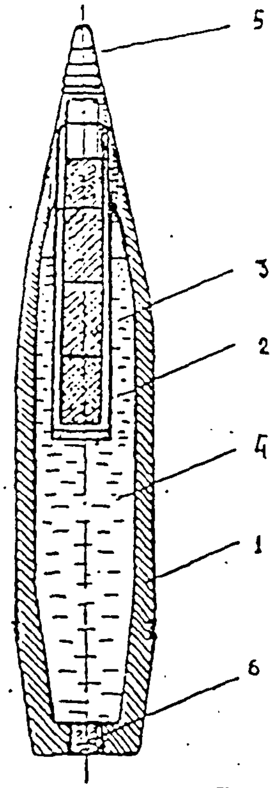


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin and to contaminate matériel, terrain and engineering structures
2.	Calibre	152 mm
3.	CW agent	
	Name	Viscous lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Time
6.	Weight of shell	42.5 kg
7.	Weight of CW agent	5.4 kg
8.	Filling coefficient	0.13
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 6. 152-mm chemical tube artillery shell

1. Casing
2. Burster tube
3. Bursting charge
4. CW agent
5. Fuse
6. Filler hole

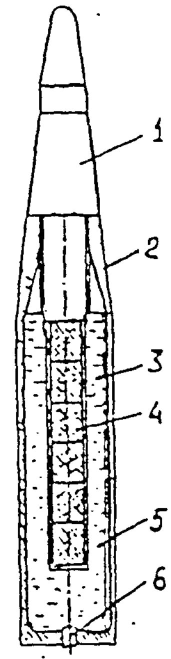


Combat characteristics

1.	Purpose	To disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	130 mm
3.	CW agent	
	Name	VX
	Combat condition	Dense aerosol and droplets
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Proximity
6.	Weight of shell	33.4 kg
7.	Weight of CW agent	1.4 kg
8.	Filling coefficient	0.04
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 7. 130-mm chemical tube artillery shell

1. Fuse
2. Body
3. Primer tube
4. Bursting charge
5. CW agent
6. Filler hole

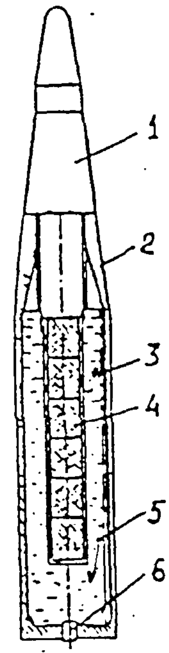


Combat characteristics

1.	Purpose	To disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	122 mm
3.	CW agent	
	Name	VX
	Combat condition	Dense aerosol and droplets
4.	Method of dispersion	Explosion of bursting charge
5.	Fuse type	Proximity
6.	Weight of missile	19.3 kg
7.	Weight of CW agent	2.9 kg
8.	Filling coefficient	0.15
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 8. 122-mm chemical rocket missile

1. Fuse
2. Body
3. Primer tube
4. Bursting charge
5. CW agent
6. Filler hole

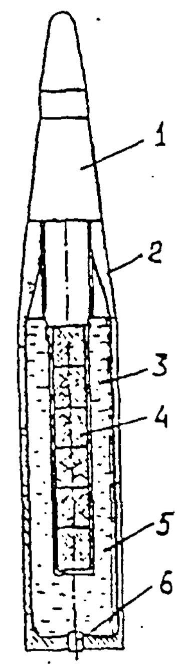


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	122 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of missile	19.3 kg
7.	Weight of CW agent	3.1 kg
8.	Filling coefficient	0.16
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 9. 122-mm chemical rocket missile

1. Fuse
2. Body
3. Primer tube
4. Bursting charge
5. CW agent
6. Filler hole

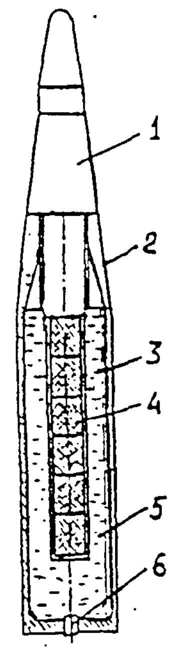


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	140 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of missile	18.3 kg
7.	Weight of CW agent	2.2 kg
8.	Filling coefficient	0.12
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 10. 140-mm chemical rocket missile

1. Fuse
2. Body
3. Primer tube
4. Bursting charge
5. CW agent
6. Filler hole



Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	240 mm
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of CW agent dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of missile	44.3 kg
7.	Weight of CW agent	8.0 kg
8.	Filling coefficient	0.18
9.	Explosive	TNT
10.	Construction materials	Steel, copper, aluminium

Figure 11. 240-mm chemical rocket missile

Annex 5

Chemical warheads for tactical missiles

Chemical warhead for 540-mm tactical missile

The warhead consists of a casing with a filler hole, a bursting charge, a VT fuse and a CW agent (figure 12).

Combat characteristics of the warhead

The chemical warhead is designed to disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The warhead is filled with the CW agent VX.

Combat condition when used - dense aerosol and droplets. Method of CW agent dispersion after opening of warhead by means of bursting charge - fragmentation of the VX by an inflow of air.

Weight of warhead - 436 kg. Weight of VX - 216 kg.

Filling coefficient of warhead with CW agent - 0.5.

Steel, aluminium and copper are used in warhead construction.

Chemical warhead for 884-mm tactical missile

The warhead consists of a casing with a filler hole, a bursting charge, a VT fuse and a CW agent (figure 13).

Combat characteristics of the warhead

The chemical warhead is designed to disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The warhead is filled with the CW agent viscous VX.

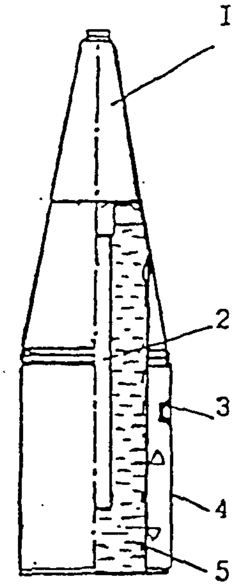
Combat condition when used - dense aerosol and droplets. Method of CW agent dispersion after opening of warhead by means of bursting charge - fragmentation of the viscous VX by an inflow of air.

Weight of the warhead - 985 kg. Weight of the viscous VX - 555 kg.

Filling coefficient of warhead with CW agent - 0.56.

Steel, aluminium and copper are used in warhead construction.

1. VT fuse
2. Bursting charge
3. Filler hole
4. Casing
5. CW agent

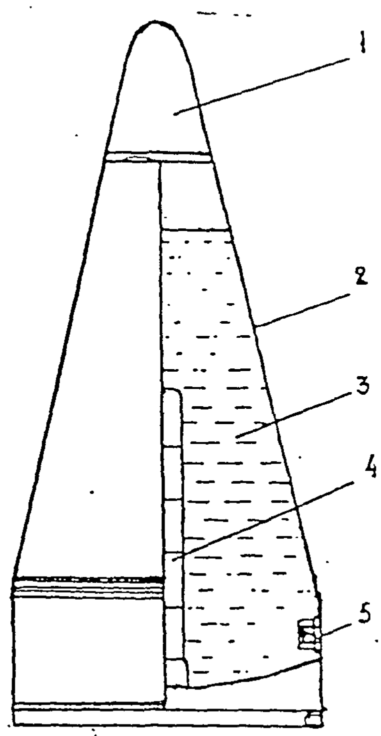


Combat characteristics

1.	Purpose	To disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	540 mm
3.	CW agent	
	Name	VX
	Combat condition	Dense aerosol and droplets
4.	Method of CW agent dispersion	Opening of warhead by means of bursting charge, fragmentation of the CW agent by inflow of air
5.	Weight of warhead	436.0 kg
6.	Weight of CW agent	216.0 kg
7.	Filling coefficient	0.5
8.	Construction materials	Steel, copper, aluminium

Figure 12. Chemical warhead for 540-mm tactical missile

1. VT fuse
2. Casing
3. CW agent
4. Bursting charge
5. Filler hole



Combat characteristics

1.	Purpose	To disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	884 mm
3.	CW agent	
	Name	Viscous VX
	Combat condition	Dense aerosol and droplets
4.	Method of CW agent dispersion	Opening of the warhead by means of bursting charge, fragmentation of the CW agent by inflow of air
5.	Weight of warhead	985.0 kg
6.	Weight of CW agent	555.0 kg
7.	Filling coefficient	0.56
8.	Construction materials	Steel, copper, aluminium

Figure 13. Chemical warhead for 884-mm tactical missile

Annex 6

Air-launched chemical munitions

100-kg chemical bomb

The bomb consists of a shell with a filler hole, a primer tube, a bursting charge, a propelling charge, an external casing and a CW agent (figure 14).

Combat characteristics of the bomb

The chemical bomb is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The bomb is filled with a mixture of the CW agents mustard gas and lewisite. Combat condition when used - vapour, aerosol and droplets. Method of CW agent dispersion in combat condition - explosion of bursting charge. A percussion fuse is used in the bomb.

Weight of bomb - 100 kg. Weight of CW agent - 39 kg. Filling coefficient - 0.39.

Steel, copper and aluminium are used in bomb construction.

100-kg. chemical bomb

The bomb consists of a shell with a filler hole, a primer tube, a bursting charge and a CW agent (figure 15).

Combat characteristics of the bomb

The chemical bomb is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The bomb is filled with a mixture of the CW agents mustard gas and lewisite. Combat condition of CW agent when used - vapour, aerosol and droplets. Method of CW agent dispersion into combat condition - explosion of the bursting charge. A percussion fuse is used in the bomb.

Weight of the bomb - 80 kg. Weight of the CW agent - 28 kg. Filling coefficient - 0.35.

Steel, copper, and aluminium are used in bomb construction.

250-kg chemical bomb

The bomb consists of a shell with a filler hole, a primer tube, a bursting charge and a CW agent (figure 16).

Combat characteristics of the bomb

The chemical bomb is designed to disable personnel through the respiratory organs.

The bomb is filled with the CW agent sarin. Combat condition of the CW agent when used - vapour and finely dispersed aerosol.

Method of CW agent dispersion into combat condition - explosion of the bursting charge. A percussion fuse is used in the bomb.

Weight of the bomb - 233 kg. Weight of sarin - 49 kg. Filling coefficient - 0.21.

Steel, copper and aluminium are used in bomb construction.

250-kg chemical spray tank

The spray tank consists of a casing with a filler hole, a primer tube, a bursting charge and a CW agent (figure 17).

Combat characteristics of the tank

The chemical spray tank is designed to disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The tank is filled with the CW agent viscous soman. Combat condition of the CW agent when used - dense aerosol and droplets. Method of CW agent dispersion after opening of the casing by means of the bursting charge - fragmentation of the CW agent by an inflow of air. A time fuse is used in the tank.

Weight of the tank - 130 kg. Weight of the CW agent - 45 kg. Filling coefficient - 0.35.

Steel, copper and aluminium are used in tank construction.

500-kg chemical spray tank

The spray tank consists of a casing with a filler hole, a bursting charge and a CW agent (figure 18).

Combat characteristics of the tank

The chemical spray tank is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures.

The tank is filled with a mixture of the CW agents mustard gas and lewisite. Combat condition of the CW agent when used - vapour, aerosol and droplets. Method of CW agent dispersion after opening of the casing by means of the bursting charge - fragmentation of the CW agent by an inflow of air. A time fuse is used in the tank.

Weight of the tank - 280 kg. Weight of the CW agent - 164 kg. Filling coefficient - 0.59.

Steel, copper and aluminium are used in tank construction.

1500-kg chemical spray tank

The spray tank consists of a casing with a filler hole, a burster charge and a CW agent (figure 19).

Combat characteristics of the tank

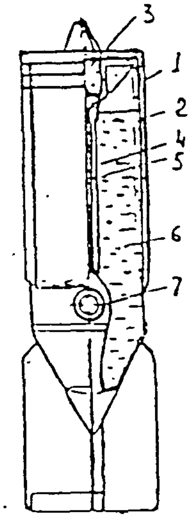
The chemical spray tank is designed to disable personnel through the respiratory organs and unprotected parts of the skin, and to contaminate terrain, matériel and engineering structures.

The tank is filled with a mixture of the CW agents mustard gas and lewisite. Combat condition of the CW agent when used - vapour, aerosol and droplets. Method of CW agent dispersion after opening of the casing by means of the bursting charge - fragmentation of the CW agent by an inflow of air. A time fuse is used in the tank.

Weight of the tank - 963 kg. Weight of CW agent - 630 kg. Filling coefficient - 0.65.

Steel, copper and aluminium are used in tank construction.

1. External casing
2. Shell
3. Propelling charge
4. Primer tube
5. Bursting charge
6. CW agent
7. Filler hole

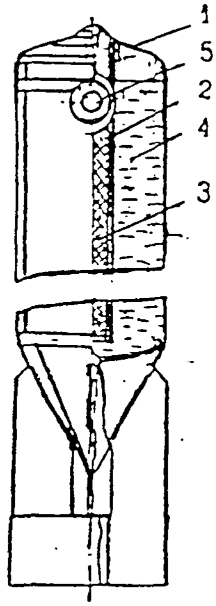


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin, and to contaminate matérial, terrain and engineering structures
2.	Calibre	100 kg
3.	CW agent	
	Name	Mixture of mustard gas and lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of bomb	100 kg
7.	Weight of CW agent	39 kg
8.	Filling coefficient	0.39
9.	Construction materials	Steel, copper, aluminium

Figure 14. 100-kg chemical bomb

1. Shell
2. Primer tube
3. Bursting charge
4. CW agent
5. Filler hole

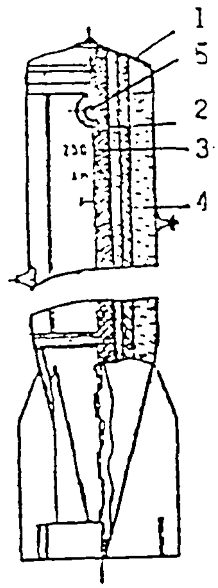


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	100 kg
3.	CW agent	
	Name	Mixture of mustard gas and lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of dispersion	Explosion of bursting charge
5.	Fuse type	Percussion
6.	Weight of bomb	80 kg
7.	Weight of CW agent	28 kg
8.	Filling coefficient	0.35
9.	Construction materials	Steel, copper, aluminium

Figure 15. 100-kg chemical bomb

1. Shell
2. Primer tube
3. Bursting charge
4. CW agent
5. Filler hole

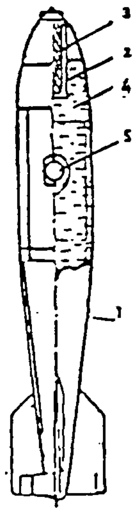


Combat characteristics

1.	Purpose	To disable personnel through respiratory organs
2.	Calibre	250 kg
3.	CW agent	
	Name	Sarin
	Combat condition	Vapour and finely dispersed aerosol
4.	Method of dispersion	Explosion of bursting charge
5.	Fuse type	Instantaneous percussion
6.	Weight of bomb	233 kg
7.	Weight of CW agent	49 kg
8.	Filling coefficient	0.21
9.	Construction materials	Steel, copper, aluminium

Figure 16. 250-kg chemical bomb

1. Casing
2. Primer tube
3. Bursting charge
4. CW agent
5. Filler hole



Combat characteristics

1.	Purpose	To disable personnel through unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	250 kg
3.	CW agent	
	Name	Viscous soman
	Combat condition	Dense aerosol and droplets
4.	Method of CW agent dispersion	Opening of tank by means of bursting charge, fragmentation of CW agent by an inflow of air
5.	Fuse type	Time
6.	Weight of tank	130 kg
7.	Weight of CW agent	45 kg
8.	Filling coefficient	0.35
9.	Construction materials	Steel, copper, aluminium

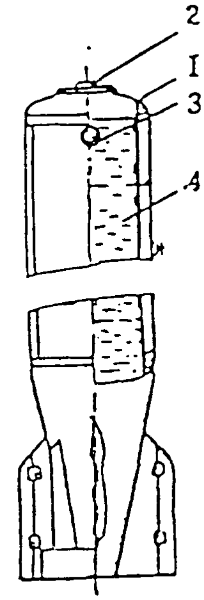
Figure 17. 250-kg chemical spray tank

1. Casing

2. Bursting charge

3. Filler hole

4. CW agent



Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	500 kg
3.	CW agent	
	Name	Mixture of mustard gas and lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of CW agent dispersion	Opening of tank by means of bursting charge, fragmentation of CW agent by an inflow of air
5.	Fuse type	Time
6.	Weight of tank	280 kg
7.	Weight of CW agent	164 kg
8.	Filling coefficient	0.59
9.	Construction materials	Steel, copper, aluminium

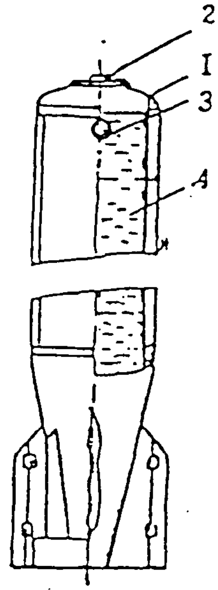
Figure 18. 500-kg chemical spray tank

1. Casing

2. Bursting charge

3. Filler hole

4. CW agent



Combat characteristics

1.	Purpose	To disable personnel through respiratory organs and unprotected parts of the skin, and to contaminate matériel, terrain and engineering structures
2.	Calibre	1500 kg
3.	CW agent	
	Name	Mixture of mustard gas and lewisite
	Combat condition	Vapour, aerosol and droplets
4.	Method of CW agent dispersion	Opening of tank by means of bursting charge, fragmentation of CW agent by an inflow of air
5.	Fuse type	Time
6.	Weight of tank	963 kg
7.	Weight of CW agent	630 kg
8.	Filling coefficient	0.65
9.	Construction materials	Steel, copper, aluminium

Figure 19. 1500-kg chemical spray tank

Annex 7

Chemical agents for close combat

Chemical hand-grenade

The hand-grenade consists of a body with an outlet hole, an igniter set and pyrotechnical mixture containing a CW agent (figure 20).

Combat characteristics of the grenade.

The hand-grenade is designed to incapacitate personnel temporarily.

The grenade is filled with a pyrotechnical mixture containing the CW agent CS. Combat condition of the CW agent when used - vapour and finely dispersed aerosol. Method of CW agent dispersion - sublimation from the pyrotechnical mixture.

Weight of the grenade - 0.25 kg. Weight of the pyrotechnical mixture - 0.17 kg.

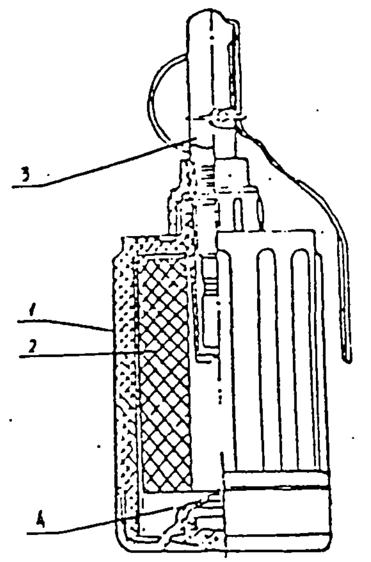
Polyethylene, steel and aluminium are used in grenade construction.

1. Body

2. Pyrotechnical mixture containing CW agent

3. Igniter set

4. Outlet hole.



Combat characteristics

1.	Purpose	To incapacitate personnel temporarily
2.	CW agent	
	Name	CS
	Combat condition	Vapour and finely dispersed aerosol
3.	Method of CW agent dispersion	Sublimation from pyrotechnical mixture
4.	Weight of grenade	0.25 kg
5.	Weight of pyrotechnical mixture	0.17 kg
6.	Construction materials	Steel, aluminium, polyethylene

Figure 20. Chemical hand-grenade

Annex 8

The Soviet Army's chemical warfare agents

The standard chemical munitions placed on display contain the following CW agents: mustard gas/lewisite mixture, viscous lewisite, sarin, viscous soman, VX, viscous VX and CS (table 1).

These agents are used in the following equipment:

Mustard gas/lewisite mixture - aerial bombs and spray tanks;

Viscous lewisite - tube artillery shells;

Sarin - tube and rocket artillery shells and aerial bombs;

Viscous soman - spray tanks;

VX - tube and rocket artillery shells and tactical missile warheads;

Viscous VX - tactical missile warheads;

CS - chemical hand-grenades.

There are no binary chemical weapons in the Soviet Army.

Mustard gas/lewisite mixture.

The mustard gas/lewisite mixture is a dark brown liquid with a sharp, unpleasant odour.

Physico-chemical characteristics:

Boiling point:	Above 200°C
Freezing point:	-48.5 -50°C
Density:	1.428×10^{3} kg/m^3
Volatility:	1.53×10^{-3} kg/m^3
Dynamic viscosity:	8.7×10^{-3} Pa.s
Surface tension:	4.4×10^{-2} kg/s^2
Diffusion coefficient:	5.83×10^{-6} m^2/s.

The toxicological characteristics of this preparation are determined by the properties of its constituents, which are nerve and paralysing agents producing marked blister effects:

Ineffective dose on the skin of a rabbit:	0.0005 mg/cm^2
Minimum effective dose on the skin of a rabbit:	0.005 mg/cm^2

Minimum necrogenic dose on the skin of a rabbit:	0.05 - 0.10 mg/cm^2
Absolutely lethal dose on the skin of a dog:	60 - 70 mg/kg

Viscous lewisite

Viscous lewisite is a highly viscous dark brown liquid.

Physico-chemical characteristics:

Boiling point:	170-196°C
Freezing point:	-40°C
Density:	(1.86-1.92).10^3 kg/m^3
Dynamic viscosity:	30.0x10^{-2} Pa.s
Volatility:	2.3x10^{-3} kg/m^3
Diffusion coefficient:	5.83x10^{-6} m^2/s

The effect produced by viscous lewisite is attributable to the toxic properties of its basic component, lewisite. Viscous lewisite produces its effects through the unprotected parts of the skin.

Toxicological characteristics:

Ineffective dose on the skin of a rabbit:	0.0005 - 0.001 mg/cm^2
Minimum effective dose on the skin of a rabbit:	0.005 mg/cm^2
Minimum necrogenic dose on the skin of a rabbit:	0.05 mg/cm^2
Absolutely lethal dose on the skin of a dog:	30 mg/kg

Sarin

Sarin is a light yellow mobile liquid with a fruity smell.

Physico-chemical characteristics:

Boiling point:	147-151.5°C
Freezing point:	-56°C
Density	1.098x10^3 kg/m^3
Volatility:	1.41x10^{-2} kg/m^3
Dynamic viscosity:	1.92x10^{-3} Pa.s

Heat capacity:	1.911 kJ/kg.°C
Latent heat of evaporation:	$4.027x10^2$ kJ/kg
Diffusion coefficient:	$5.92x10^{-6}$ m^2/s

Toxicologically, sarin is a nerve agent. It produces its effects after its introduction into the organism by any means.

Toxicological characteristics:

(Median toxic dose)

Intramuscularly, mg per kg of animal weight:

White mouse:	0.23
White rat:	0.074
Rabbit:	0.025
Guinea-pig:	0.037

Intravenously, mg per kg of animal weight:

Rabbit:	0.021
Guinea-pig:	0.019

By inhalation, 100 $mg.min/m^3$ for a rabbit.

Viscous soman

Viscous soman is a yellowish-brown, highly viscous liquid with a slight aromatic odour.

Physico-chemical characteristics:

Boiling poing	190°C
Freezing point	-80°C
Density:	$1.035x10^3$ kg/m^3
Volatility:	$2.65x10^{-3}$ kg/m^3
Dynamic viscosity:	$17.5x10^{-2}$ Pa.s
Surface tension:	$2.65x10^{-2}$ kg/s^2
Diffusion coefficient:	$4.83x10^{-6}$ m^2/s
Heat capacity:	2.205 kJ/kg.°C

The toxic action of viscous soman is attributable to its basic component, soman, which is a nerve agent. Viscous soman produces its effects through its introduction into the organism by any means.

The median lethal dose for intravenous administration of soman is as follows:

Guinea-pig:	0.014 mg/kg
White mouse:	0.084 mg/kg

VX

VX is a dark brown liquid with a high boiling point.

Physico-chemical characteristics:

Boiling point:	Above 300°C
Freezing point:	Below -66°C
Density:	1.014×10^{3} kg/m^{3}
Volatility:	0.54×10^{-5} kg/m^{3}
Dynamic viscosity:	9.15×10^{-3} Pa.s
Surface tension:	2.96×10^{-2} kg/s^{2}
Diffusion coefficient:	4.0×10^{-6} m^{2}/s
Heat capacity:	1.928 kJ/kg.°C

VX produces its effects when it is introduced into the organism by various means.

The median lethal dose is as follows:

Intravenously:

White mouse:	0.0220 mg/kg
Rabbit:	0.0064 mg/kg

Percutaneously:

White rat:	0.090 mg/kg
Cat:	0.011 mg/kg

Viscous VX

Viscous VX is a yellowish-brown dense liquid, the basic component of which is the CW agent VX.

Physico-chemical characteristics:

Boiling point:	Above 300°C
Freezing point:	Below -70°C
Density:	1.025×10^3 kg/m^3
Volatility:	0.45×10^{-5} kg/m^3
Dynamic viscosity:	15.8×10^{-2} Pa.s
Surface tension:	3.19×10^{-2} kg/s^2
Diffusion coefficient:	3.8×10^{-6} m^2/s
Heat capacity:	1,930 kJ/kg.°C

The effects of viscous VX are similar to those of VX.

The median lethal dose for intravenous administration is as follows:

Cat:	0.0034 mg/kg
White rat:	0.0070 mg/kg

CS

CS is a crystalline substance which ranges from white to brown in colour and darkens when heated.

Physico-chemical characteristics:

Melting point:	93-95°C
Boiling point:	310-315°C
Weight by volume:	$1.6-3.2 \times 10^2$ kg/m^3
Content of active agent:	Not less than 97 per cent
Moisture content:	Not more than 0.5 per cent
Decomposition point:	Above 625°C
Volatility:	1.10^{-7} kg/m^3

CS has a low toxicity level whatever the means of absorption. However, it produces a highly irritating effect on the respiratory organs and the eyes.

The median incapacitating dose absorbed by inhalation ranges from 1.0 to 5.0 mg.min/m^3.

THE SOVIET ARMY'S CHEMICAL WARFARE AGENTS

CW agents	Types of chemical munitions
Blister gases	
Mustard gas/lewisite mixture	Aerial bombs Spray tanks
Viscous lewisite	Tube artillery shells
Nerve agents	
Sarin	Tube artillery shells Rocket artillery shells Aerial bombs
Viscous soman	Spray tanks
VX	Tube artillery shells Rocket artillery shells Tactical missile warheads
Viscous VX	Tactical missile warheads
Irritant	Chemical hand-grenades
CS	

Annex 9

Standard methods for determining the toxicity of CW agents

For the purpose of classifying super-toxic lethal chemicals, a methodology is proposed for determining their intravenous toxicity in rabbits.

Median lethal doses (LD_{50}), expressed in mg per kg of animal weight, are used for evaluation purposes.

The trials are conducted in laboratory conditions with an air temperature of 18-22°C. Clinically healthy, fully grown animals weighing 2.0-2.5 kg (females and males in a 1:1 ratio) are selected for the experiment.

Each chemical is introduced into the rabbits in a water-acetone or water-alcohol solution. Acetone or alcohol is used to prepare the original mother liquor, which is then diluted with distilled water to produce solutions containing the dose of the tested chemical in 0.05 ml of the solution. 0.05 ml/kg of diluted solution is introduced into the rabbit's auricular vein.

In the first stage of the experiment, an evaluation is made of the dose range within which the median lethal dose of the chemical being studied falls. For this purpose, the substance is administered intravenously to the rabbit in increasing or decresing doses according to the effect observed. The effect is recorded as either "died" or "survived". One rabbit is used for each dose.

After the chemical's toxicity range has been determined, the second stage of the experiment is carried out to determine the value of the median lethal dose. For this purpose four groups of six rabbits are required, three for test purposes and one control group. The test animals are given various doses of the chemical, and the control rabbits an equal amount of solvent.

The results of the intoxication are clinically observed for two days. An autopsy is performed on the animals that have died in order to determine the exact cause of death.

The median lethal dose is calculated by the probit method, which can be carried out either manually, by preparing a logarithmic chart, or on various types of computer, using appropriate programs.

The results indicating the intravenous toxicity of the super-toxic lethal chemicals are entered into a record which shows:

The date and time of the experiments;

Weather conditions;

Data concerning the chemical tested (classification number, place, date and order of selection of samples, external appearance, physico-chemical properties);

Dose of substance administered and effects observed;

Clinical description of the effects;

Calculated median lethal dose.

Following intravenous administration of the CW agent, the rabbits present a clinical picture of injury, agitation and tonoclonic spasms.

Death occurs within a few minutes or hours, depending on the amount of the effective dose.

Annex 10

Mobile unit for the destruction of chemical weapons

Purpose, technical characteristics and principles governing the use of the mobile chemical weapon destruction unit

The unit is intended for the independent destruction in field conditions of chemical air-launched and artillery munitions and tactical missile warheads containing the nerve agents sarin, viscous soman, VX and viscous VX.

Depending on the nature and scale of the operation and the time available, several of these units can be used jointly.

Composition of the unit and its basic technical characteristics

The unit consists of the following components:

1.	Chemical monitoring equipment	1
2.	Transport vehicle with trailer on which the "Neitral" installation is mounted	1
3.	Mobile chemical laboratory	1
4.	Chemical tanker	2
5.	Tractor	2
6.	Burner	1
7.	Power plant	1
8.	Compressor	1
9.	Transport vehicle	1
10.	Shower unit	1

Principal technical characteristics of the unit:

Deployment time	10 hours
Manpower requirement	17 persons

Electricity consumption: power - 131 kW
voltage - 380/220 V

Overall weight: 66.3 t

The unit can be moved to the destruction site under its own power, by air or by rail.

Preliminary reconnaissance is carried out in the area where the work is to be done with a view to guaranteeing the safety of the operation; arrangements are made for demarcation of the area and the protection and chemical monitoring of the environment.

The unit consists of the following components:

1. Chemical monitoring equipment checks any contamination of the air in the area of operations during the destruction of chemical weapons.

2. The "Neitral" installation neutralizes the CW agent; the feed level and the automatic maintenance of the required temperature are continuously checked.

3. The chambers in which the CW agents are removed are intended for opening up the casings of the munitions to be destroyed. There are three versions of the chambers, for small-calibre, medium-calibre and large-calibre munitions.

4. The mobile chemical laboratory is intended for carrying out analytical monitoring of the destruction of the CW agents and analysis of soil, vegetation and air samples in the area of operation.

5. The chemical tankers transport the material to be neutralized, transfer it to the "Neitral" installation and transport the neutralization products to the burner.

6. The burner is used for thermal decomposition of the CW agent neutralization products at a temperature of around 1,200°C.

7. The power plant provides the mobile unit with electric power. It has a capacity of 200 kW.

8. The compressor is used to provide the mobile unit with compressed air and also to fill tanks with compressed air for the incinerator.

9. The function of the lift trucks is to carry the munitions from the lorry to the CW agent removal chamber.

10. The shower facility is used for personal cleansing (washing) by the personnel operating the unit. The facility has two shower units each consisting of six cubicles.

The facility includes changing and washing rooms.

Technology for the destruction of chemical munitions at the mobile unit

A flow chart for the destruction of air-launched and artillery munitions and warheads of tactical missiles filled with the nerve agents sarin, soman and VX at a mobile unit is shown in figure 21.

The calibres of the munitions to be destroyed range from 1 kg to 500.0 kg.

The arrangement comprises a chamber for removing CW agents, a "Neitral" neutralization unit, an ARS-14U chemical tanker, an IIG426 burner, an AL-4 mobile chemical laboratory, a lift truck, a casing neutralization chamber, a vacuum pump and instrumentation to control and monitor the operation of the unit and the state of the environment.

The destruction technology is essentially a thermochemical process involving neutralization of the CW agents and combustion of the neutralization products to form inorganic compounds in concentrations within the specified maximum permissible range.

The munitions to be destroyed are placed, depending on calibre, in one of the removal chambers (RM, RS and RK), which is connected by flexible pipes fitted with seals to the "Neitral" unit and the ARS-14U chemical tanker.

The munitions are opened in a hermetically sealed chamber by drilling a hole in the casing; obturation and evacuation of the CW agent into the "Neitral" reactor is then effected under a vacuum created by the vacuum pump.

The process of neutralization takes place at temperatures of 100-120°C over a period of 30-40 minutes.

The content of toxic substances in the reactive mass of sarin neutralization products is less than LD_{50}, or 1,200 mg/kg, for a rabbit.

Once the reaction is completed, the neutralization products are pumped out of the "Neitral" reactor into the chemical tanker and fed into the burner.

The combustion of the neutralization products takes place at a temperature of around 1,200°C. The combustion products are carbon, sulphur and phosphorus oxides and hydrogen fluoride.

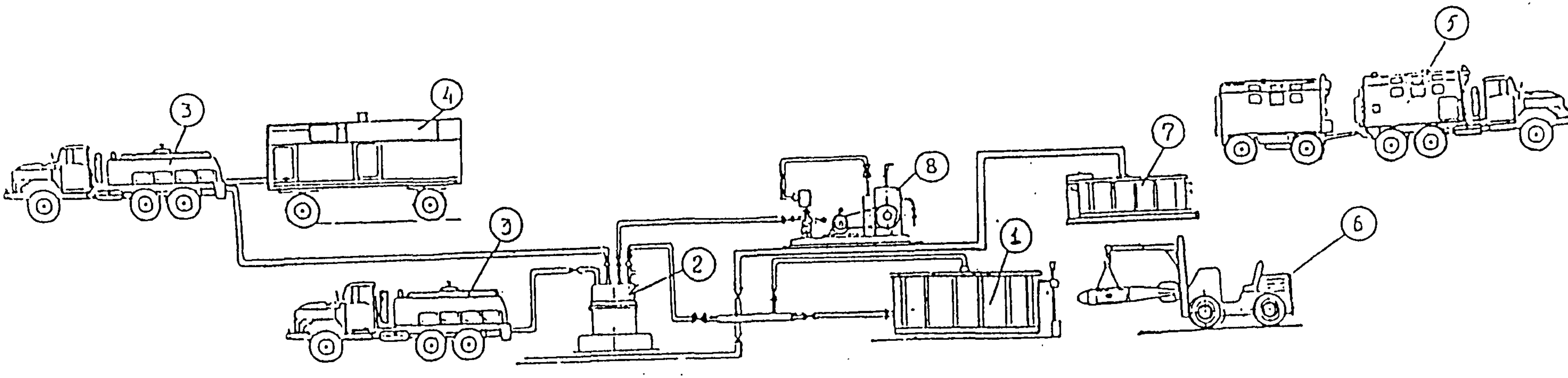
Neutralization of the munitions casing, after removal of the CW agents, is carried out in a separate chamber.

The basic functional components of the unit - the removal chamber, "Neitral" unit and casing neutralization chamber - are hermetically sealed, thus preventing toxic substances from being released into the environment.

The destruction process is monitored by steady-state instruments on control panels.

Analytical monitoring of CW agent content in the reactive mass, on the surface of equipment and in the air is carried out periodically in the AL-4 laboratory, and the ambient air in the working area is continuously monitored by means of gas indicators.

For safety reasons, personnel working on the mobile unit wear individual equipment to protect the respiratory organs and skin.



1. CW agent removal chamber
2. "Neitral" neutralization unit
3. ARS-14U chemical tanker
4. IIG426 burner
5. AL-4 mobile chemical laboratory
6. Lift truck
7. Casing decontamination chamber
8. Vacuum pump

Figure 21. Destruction technology flow chart

Safety arrangements during the destruction of chemical munitions at the mobile unit and their application

For reasons of safety, the equipment of the unit is stationed at an adequate distance from populated areas, taking into account the nature and scale of operations which the unit has to perform. The site at which the unit is located is declared a prohibited area and appropriate security arrangements are made.

Persons not less than 18 years of age who have suitable training and skills and are physically fit are allowed to work in the unit.

Before commencing a shift, the operating personnel undergo a compulsory medical check and are given instruction in safety precautions. The medical check is carried out by a specialist. Instruction in safety precautions is provided by a safety engineer and a doctor specializing in toxicology.

Immediately before proceeding with the destruction of chemical weapons, the personnel assigned to carry out the process put on individual protective clothing for the skin and respirators, which are then checked for airtightness in a special chamber. A full set of individual protective clothing is required for work with damaged munitions. When destroying technically sound chemical munitions, personnel are permitted to work without individual protective clothing, but must wear respirators. This degree of protection completely precludes the possibility of the personnel being contaminated during the destruction of chemical weapons. When the ambient air temperature is high, work is organized with shortened shifts.

The principal operations required by the technology are mechanized.

The agents and reagents are fed into the "Neitral" reactor and the neutralization products are pumped out of the reactor and into the furnace for combustion by the chemical tankers, using the least possible number of personnel.

The design of the removal chamber equipment, seal fittings, "Neitral" reactor and other assemblies and components prevents the personnel from coming into contact with the droplet gas, and operation of the equipment under vacuum precludes the possibility of the personnel being contaminated by inhalation.

An obligatory and high-priority operation required by the technology is the maintenance of a vacuum in the "Neitral" reactor so that the process of destruction of the CW agents need not be interrupted even if the power supply is temporarily disconnected.

Continuous monitoring of air contamination is obligatory during operation of the unit. If a warning device is activated, the destruction process is halted and the cause of the air contamination is identified and eliminated. If the power supply is disconnected, the air is analysed by means of a rapid detector.

In the event of an emergency involving contamination of the working area, the chemical tanker is used to decontaminate the site and equipment.

Once the work has been completed, the extent of any contamination is checked and individual protective clothing is specially treated. Where such clothing has come into contact with droplet gas, it is packed into hermetically sealed containers and sent to the decontamination centre.

After removing their protective clothing, the personnel are processed in a disinfection and medical checkpoint.

Thus, the equipment design of the unit, the constant medical supervision and the reliable individual protective clothing used during the operations completely preclude the possibility of contamination of the unit's crew and the population of nearby areas and ensure a high degree of environmental safety.

Verification of the completeness of the destruction of chemical weapons at the mobile unit, and environmental protection measures

The main aim of environmental protection measures relating to the operation of the mobile chemical weapon destruction unit is to prevent pollution of the atmosphere, soil, water and vegetation by CW agents and by their neutralization products.

This is achieved in the following way:

First, the airtightness of the unit's equipment completely prevents CW agents from entering the atmosphere;

Second, the destruction process involves the chemical transformation and decomposition of the CW agents and neutralization products to safe concentrations as specified by the health authorities.

The destruction of 1 t of CW agent produces slightly more than 2 m^3 of liquid waste, which is rendered environmentally harmless after combustion.

The safety measures include monitoring of the destruction process and environmental monitoring.

Annex 11

Instructions for the use of protective equipment

Ladies and Gentlemen, Comrades,

You have been issued with respirators. Respirators provide reliable protection against the action of chemicals. They must fit properly, so before being issued with a respirator each of you will have the circumference of his or her head measured vertically and horizontally.

The respirators are tested by determining their airtightness in protecting the sense organs in air containing an irritant.

The agent used to test the respirators irritates the mucous membranes of the eyes, the respiratory organs and the exposed, and especially moist, parts of the skin.

The irritation has no lasting effects. If the agent enters the eyes, the result will be strong lachrymation that can be stopped by washing the eyes with water.

If the agent enters the respiratory organs, the result will be a burning sensation in the nasopharynx, combined with sneezing and coughing. To stop this you must rinse your throat with water and take several deep breaths of fresh air.

Should the agent come into contact with the skin, the result will be a burning sensation. If this happens, you are not advised to rub the affected parts with the hands. The burning sensation will pass after 5-10 minutes.

Those persons who are to observe the unit in operation directly must not remove the respirators after they have been checked for airtightness. Those who will be watching the unit in operation on closed-circuit television do not need to wear respirators.

The respirator consists of a mask and a filter canister.

To check the airtightness of the respirator, you must:

1. Remove the respirator from the carrier and put it on, as follows:

   Take two side straps in each hand and pull them to the side;

   Place the chin in the lower cavity of the facepiece;

   Pull the mask over the head by moving your hands up and back;

   Straighten the mask and straps and smooth out the material of the facepiece.

2. Put on the tunic.

3. Go to the chamber containing the irritant substance and stand facing the canvas sleeve at a distance of one metre.

4. When directed by the instructor to "Begin test":

Approach the sleeve and open it;

With the respirator fitted, introduce your head into the chamber through the sleeve;

Carefully take a short breath and, if you feel no irritation of the respiratory organs or eyes, continue to inhale, taking deep breaths and turning the head.

5. When directed by the instructor to "End test":

Release the sleeve;

Withdraw your head from the chamber;

Tighten the cord on the sleeve;

Move upwind;

Remove the respirator and place it in the carrier;

Remove the tunic and wash your hands.

6. The position of the respirator straps must not be altered without authorization after the airtightness test.

7. If you feel any irritation of the respiratory organs or eyes when testing the respirator in the chamber:

Immediately move away from the chamber;

Go upwind;

Remove the respirator and ask the instructor for guidance.