MEASURES TO DEAL WITH CHEMICAL TERRORISM

Section 1 : Chemical Terrorism

Chemical terrorism is defined as a case in which chemical agents are used as terrorists' weapons. Chemical agents are chemical substances generally used as chemical weapons, and they are defined as materials that are harmful to humans, animals, and plants. The chemical agents used are irritants and generally, highly toxic.

Fire fighting and rescue activities in the event of a disaster caused by chemical terrorism, should be conducted according to procedures for fire fighting and rescue activities in the case of a chemical disaster occurred in a facility with poisonous/deleterious substances, or occurred from a transport vehicle of such substances. In addition to those procedures, however, it will be necessary to conduct very difficult fire fighting and rescue protocols using a higher level of knowledge, judgment, and control to deal with a disaster caused by terrorism. This is because such a disaster involves a strong toxicity unique to chemical agents, a high number of casualties, and difficulty in identifying the toxic substance, etc.

This chapter describes points of concern when conducting fire fighting and rescue activities in the event of a chemical terrorism attack.

1 - 1 Measures taken in the past after the sarin case, etc.

On 20th March 1995, an indiscriminate terrorism act named "The subway sarin case" occurred where a deadly poisonous chemical agent "Sarin" was scattered in the subway cars of Hibiya, Chiyoda and Marunouchi Lines of the Eidan subway in Tokyo killing 12 people and injuring more than 5,000 people. At midnight of 27th June, 1994, about 9 months before the case, "Sarin" was scattered in a residential area of Matsumoto city, Nagano prefecture causing 7 death casualties and more than 600 wounded people. This was called the "Matsumoto Sarin Case".

The religious body responsible for the attack committed another case of murder using a chemical agent "VX" which is more poisonous than Sarin. They also possessed "Anthrax bacillus" and "Botulinus baccilus" which were to be used as chemical weapons. In particular, it was revealed that they actually scattered anthrax bacillus in Tokyo.

Biological and chemical weapons are called "Poor people's nuclear bombs" because they can be created by a production system that is much cheaper than a nuclear weapon production system. Criminal cases committed by the religious body heightened awareness of terrorism by biological and chemical weapons throughout the world.

In "The subway sarin case", 135 fire fighters were injured during the rescue operation. After that, the Fire Defense Agency compiled the "Security in rescue activities against poisonous gas cases (Fire fighting and rescue No. 43 of April 6, 1995)". In this notification, the Agency called attention to the fire fighters' safety management and focused on the maintenance of the protective equipment and materials. Following this notification, local fire departments have upgraded the protective equipment including the positive pressure type chemical protective suit, the detecting equipment, etc.

1 - 2 Classification of Chemicals

Chemicals may be classified into chemical weapon agents synthesized as materials for chemical weapons, chemical substances generally used as industrial chemicals, and incapacitated or riot suppression agents used to temporarily suppress human activities. Main features of those agents are as follows:

(1) Chemical weapon agents

A. Nervous effect agents

Tabun (GA), Sarin (GB), Soman (GD), V-agent (VX), etc.

(a) Disables nerves, preventing transmission of information.
(b) Highly poisonous, causing death even with a small amount.
(c) Exists in liquid form at ordinary temperatures, being highly volatile except for VX.
(d) Has a higher specific gravity than air.
(e) The toxicity level, from highest to lowest, is VX, GD, GB, and GA.
(f) Symptoms are contracted pupil, respiratory difficulty, convulsion, vomiting, diarrhea, watery eyes, salivation, incontinence, etc.

B. Vesicant

Sulfur mustard gas (H, HD), Nitrogen mustard gas (HN), Lewisite (L), Phosgene oxime (CX), etc.

(a) Causes inflammation of the skin, eyes, and airways.
(b) Symptoms caused by mustard gases progress slowly.

(c) The duration (effective time after sprayed) is long.
(d) Has a higher specific gravity than air.
(e) Symptoms are eye pain/discomfort, skin pain, burn, blister, cough, airways pain, running nose, etc. Symptoms caused by mustard gases will progress over time.

(2) Industrial chemicals

A. Hematologic agents

Hydrogen cyanide (AC), Cyanogen chloride (CK), etc.

(a) Carried by blood, it inhibits oxygen utilization of cells.
(b) Acts quickly.
(c) AC has a lower specific gravity than air (only one among the main toxic chemicals), while CK has a higher gravity than air.
(d) Causes symptoms of dizziness, vomiting, headache, respiratory difficulty, etc. If inhaled in high concentration, ventilation activity will increase in 15 seconds, consciousness will be lost and convulsions will start within 30 seconds, and respiration will stop in a few minutes.

B. Asphyxiant

Chlorine (CL), Phosgene (CG), etc.

(a) Inhalation may cause lung edema, and even death.
(b) In general, inhalation of a high concentration causes an immediate effect, while inhalation of a low concentration causes a slow effect.
(c) Has a higher specific gravity than air.
(d) Symptoms include a burning pain of the eyes/nose/mouth, watery eyes, running nose, vomiting, headache, cough, respiratory difficulty, chest pain, etc. Inhalation of a high concentration causes airway obstruction due to pharyngismus or edema.

(3) Incapacitant, Riot suppression agent

A. Incapacitant
(a) Causes people to out of work for a short time (or a long time).
(b) Includes 3-quinuclidinyl benzilate, lysergic acid dimethylamide (LSD), etc.

B. Riot suppression agent

(a) People may be out of work for a shorter time than that of the incapacitant.

(b) Includes capsaicin (red pepper extract; used for self-defense spray) as an irritant (or a tear gas), adamsite (causes irritation similar to that of pepper, exhibiting watery eyes, sneezing, vomiting) as a vomiting agent, etc.

Classification, Features, etc. of Representative Poisonous Chemicals

Classification	Name	Symbol	Odor	Action speed	Symptoms	First-aid treatment
Nervous effect agent	Tabun	GA	Non	Very fast	1 Pupil contraction makes people blind. 2 Serious sweating, vomiting, shivering, etc 3 Spasm, convulsion, coma, etc., and respiratory stoppage	· Wash the victim's face and move the victim to another place. · Atropine and oxime injection · Artificial respiration Manual artificial respiration, and cardiac massage as necessary · Decontamination of the skin etc using soapy water, individual decontamination tool, etc
	Sarin	GB	Non			
	Soman	GD	Fruit odor			
	V-agent	VX	Non	Fast		
Vesicant	Mustard	HD HN	Garlic odor Fish or mold odor	Slow (a few or several hours)	1 Congestive eyes, eyes pain, watery eyes 2 Skin flare, bulla, erosion 3 Inflammation in airways, which may lead to pneumonia.	· Repeat washing the face, and apply British anti-lewisite eye lotion. · Remove the agent that is adhered to the face, and decontaminate using soapy water, individual decontamination tool, etc.
	Lewisite	L	Geranium odor	Fast		
Hematologic agent	Hydrogen cyanide	AC	Almond odor	Very fast	1 Irritating pain in the eyes, nose, throat. 2 Headache, dizziness, nausea 3 Feeling of chest pressure, respiratory difficulty, spasm	· Inhalation of stem using amyl nitrite · Manual artificial respiration
	Cyanogen chloride	CK		Fast		
Suffocating agent	Phosgene	CG	New hay and corn odor	Fast	1 Cough and feeling of chest pressure 2 Nausea, vomiting, headache 3 Respiratory difficulty, and becomes a shock state	· Warm the victim's body and make the victim rest in bed. · Warm the victim's body and make the victim rest (for 24 hours). (Even if the victim does not feel a serious subjective symptom, a sudden symptom may occur within a few hours.) · As a first-aid treatment, apply oxygen inhalation. (In general, artificial respiration should be avoided)
	Diphosgene	DP				

1 - 3 Features of disasters caused by chemical terrorism

In comparison with chemical disasters occurring from poisonous/deleterious substances, disasters caused by chemical terrorism have the following features :

(1) It is difficult to predict the occurrence of disasters caused by chemical terrorism because such terrorism occurs in places where chemical substances are not usually handled and nobody expects such disasters due to poisonous/deleterious substance.

(2) It takes time and is difficult to identify what substance caused the disaster, because detecting equipment and materials are required for identification of a harmful substance.

(3) Some chemicals used for terrorism are made for the purpose of killing people, and differ from those used for industrial purposes. They have a very high toxicity, taking effect at once as well as being lethal from little exposure.

(4) Possible to occur in a crowded place, and highly possible to kill a number of people at once. In particular, if occurred in a building or inside public transport facilities, a great number of casualties are expected.

(5) Chemical terrorism may occur not only in one place but also in many places simultaneously, and the chemicals may be dispersed in wide areas.

(6) Terrorism is a crime, so the chemical substance used will be treated as the evidence. Therefore, such evidential samples must be treated in consultation with the police.

1 - 4 Chemicals entering pathway into human bodies & Physical protective measures

(1) Chemicals entering pathway into human bodies

Chemicals enter into the human body through the pathways listed below. In rescue activities, therefore, those pathways should be protected against chemicals.

A. Respiratories (mouth, nose)
B. Eyes
C. Skin (If a victim is wounded, chemicals may enter into human body through the wounded skin.)
D. Ingestion

(2) Physical protective measures

According to the guidelines of EPA (Environmental Protection Agency, USA), the physical protection levels are divided into 4 levels, from highest to lowest, A, B, C and D.

With respect to the physical protection equipment, level A represents the heaviest equipment. In the order of A, B, C, and D, the equipment becomes lighter making it easier for firefighters to move for rescue activities. Therefore, if it is judged that the danger level is not seriously high according to the type and concentration of chemical substance ,and other situations such as counteraction against the poison, enclosing of

the dangerous space, etc., the physical protection levels should be lowered so as to quickly conduct fire fighting and rescue activities.

A. Level A

(a) The highest level respiratory, skin and eyes protection
(b) Totally sealed protective suit and respiratory apparatus
(c) Protection against a high steam pressure, percutaneous toxicity, and cancerogenesis of chemicals
(d) Under working conditions where unexpected splashing, entry of or exposure to chemical steam is highly assumed.
(e) When dealing with unknown chemicals or chemical compounds.
(f) In the case of level A, a penetration test shall be performed to evaluate the resistance of a chemical protective suit against chemicals.
(g) The required equipment includes the pressurizing and integrated type respiratory apparatus, sealed type chemical protective suit, chemical protective glove (inner and outer), chemical protective boots (the toes and soles are made of steel), underwear made of cotton for protection against the cold *, working clothes (under the protective suit) *, protective helmet (under the protective suit) ※, radio equipment. (*: Optional)


Level A

B. Level B

(a) The same equipment as those of the level A are required for respiratory protection, but the skin protection items seen in level A are not required.
(b) Wear sealed-type protective clothes or protective clothes against splashing. In the level of B, no airtight test is required for the protective suit.
(c) The level B equipment may be used if it is known beforehand that chemicals do not have any percutaneous toxicity, and that they will not change to a gas including cancerogenesis.
(d) A penetration test and a transmission test shall be performed to evaluate the texture of the protective suit.
(e) The required equipment includes the pressurizing and integrated type respiratory apparatus, chemical protective suit


Level B

(overalls, long-sleeve jacket, chemical protective working clothes), working clothes (under the protective suit) *, chemical protective gloves (inner, outer), chemical protective outer boots (the toes and soles are made of steel), radio equipment, and protective helmet. (*: Optional)

C. Level C

(a) In respect of respiratory protection, face-covering or half-face-covering type of gas masks should be worn only if the concentration and type of air borne substances are known and such substances meet the use conditions of canisters attached to gas masks.
(b) The level C equipment may be used if it is known that pollution substances will not do harm to human bodies even if directly contacted, and that they will not be absorbed through the exposed skin.
(c) The required equipment includes the face-covering type air cleaning mask, chemical protective clothes (overalls type working clothes, chemical protective hooded suit, chemical protective hooded apron, disposable type working clothes against chemicals), chemical protective gloves (outer, inner*), chemical protective boots (the toes and soles are made of steel), working clothes made of fabrics (with underclothes to protect against chemical substances) *, radio equipment *, protective helmet, and emergency mask *. (* : Optional)


Level C

D. Level D

(a) The level D equipment may be used when there is no hazardous substance in the air.
(b) The level D equipment may be used if there is no danger of contact between human bodies and unexpected hazardous chemical substances during work.
(c) The level D means the rescue workers do not need to wear masks. In preparation for unexpected sudden dangers, however, it is indicated that they should hold the respiratory equipment for emergency cases.
(d) The required equipment includes working clothes designated for use when wearing a mask or in places where dispersion may occur.


Level D