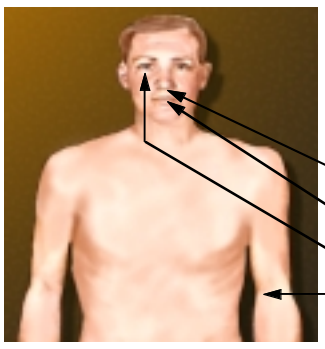


Routes of Exposure

- Inhalation
- Ingestion
- Direct contact

NERVE AGENTS

Exposure Via Skin by Degree of Severity

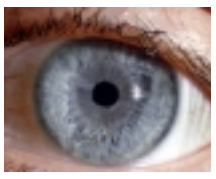
Body Part Affected	Sign(s) and Symptom(s)
Mild: (May also be effects of an initial reaction leading to a more serious reaction.)	
skin	sweating at exposure site
muscle	localized, unorganized twitching at exposure site ("bag of worms")
Moderate: (May also include symptoms under "Mild".)	
muscle	generalized (at random, all over) fasciculation and twitching; generalized weakness that increases with any form of activity
GI	nausea, vomiting, diarrhea
Severe: (May develop from symptoms under "Mild" and "Moderate"; or go directly to these symptoms.)	
muscles	extremely weak; convulsions (seizures) with eventual flaccid paralysis
lungs	cessation of respiration
(all)	sudden loss of consciousness and collapse, death

TIME COURSE:

Onset time: minutes to several hours. The larger the exposure the shorter the onset time. After a large exposure (lethal amount or greater) the effects may occur within minutes; after an asymptomatic period, the first effect may be loss of consciousness. Onset time may be as long as 18 hours after exposure; however, in such cases the effects are usually not lethal.

Exposure to Nerve Agent Vapor by Degree of Severity

Body Part Affected	Sign(s) and Symptom(s)
Mild: (May also be effects of an initial reaction leading to a more serious reaction.)	
eyes	miosis, pain (deep in eye or head); dim or blurred vision
nose	runny
lungs	"tightness in chest"; bronchoconstriction secretions in airways, cough, moderate difficulty in breathing
Moderate: (May also include symptoms under "Mild".)	
eyes	miosis, pain, dim or blurred vision
nose	runny (severe), nasal congestion
lungs	"tightness in chest", breathing is more difficult, secretions more copious
muscles	feeling of generalized weakness, generalized muscle twitching of large muscle groups
GI	nausea, vomiting, diarrhea, cramps
Severe: (May develop from symptoms under "Mild" and "Moderate"; or go directly to these symptoms.)	
muscles	convulsions, weakness with eventual flaccid paralysis
lungs	cessation of respiration
(all)	loss of consciousness, coma, death



TIME COURSE:

Onset time: seconds to several minutes. Symptoms may occur after little more than one breath of nerve agent vapor; large amounts may cause reactions within seconds. Effects do not worsen appreciably after 15-20 minutes following cessation of agent exposure.

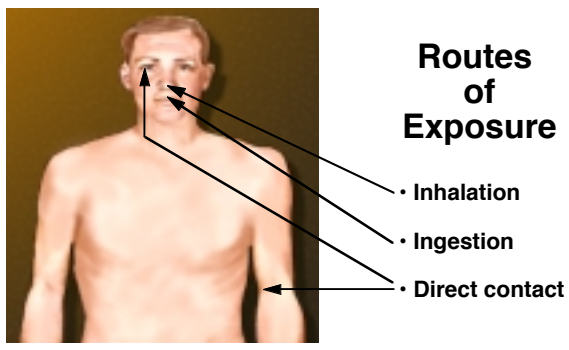
Adapted from F. R. Sidell, "Clinical Notes on Chemical Casualty Care," USAMRICD Technical Memorandum, 90-1 (1990).

Initial First Aid Treatment

Treatment for a severe nerve agent exposure **must be immediate**. Depending on the severity of the exposure, seconds can make the difference between life and death. The first aid treatment for symptomatic victims of nerve agents is immediate removal, decontamination, and antidote administration with airway management support as necessary.

The nerve agent must be neutralized and/or removed as soon as possible. The reason for neutralizing or removing the agent is that the severity of effects is directly proportional to the absorbed dose. The ideal decontamination solution is soap and water.

The initial treatment for nerve agent exposure comes as a two-part antidote:
(1) atropine to stop the effect of the nerve agent, and
(2) 2-PAM chloride to restore the normal muscle function by removing the agent.



BLISTER AGENTS

Exposure Through Direct Contact by Degree of Severity

Body Part Affected	Sign(s) and Symptom(s)
Mild:	
skin	no immediate clinical effects (no burning, stinging, or redness); becomes "fixed" to tissue within minutes, blisters appear about 2—36 hours later
eyes	within 4-12 hours after exposure, itching, tearing, conjunctivitis (reddening of tissues surrounding the eyeball), sensation of grit in eye, burning and photophobia (sensitivity to light), some swelling of eyelids
Moderate:	
skin	no immediate clinical effects; blisters appear sooner and more severe than in cases of "mild" dose
eyes	within 3-6 hours after exposure, increased intensity from "Mild" symptoms, edema (swelling) of lids to point of near closure; spasms of muscles surrounding eye; increased photophobia; blurred vision; possible discharge; miosis may also occur; severe inflammation of conjunctiva and cornea
Severe:	
skin	no immediate clinical effects; blisters appear sooner and are large; necrosis; skin charring may be evident
eyes	severe pain, increased swelling of lids to point of closure, discharge; possible damage to cornea (e.g., ulceration, perforation, etc.)
muscles	large amounts may affect nerve endings (NOTE: This is a systemic effect that may occur after large dose through skin or inhalation or combination.)

Exposure Through Inhalation/Ingestion by Degree of Severity

Body Part Affected	Sign(s) and Symptom(s)
Mild:	
nose, throat, & windpipe	burning sensation, sinus pain, cough
GI	nausea and vomiting
Moderate:	
nose, throat, & windpipe	burning sensation
lungs	chest tightness, severe cough
GI	nausea and vomiting, stomach pains
Severe:	
nose, throat, & windpipe	severe burning
lungs	difficulty breathing due to airway damage
GI	nausea, vomiting, bloody diarrhea (rate), stomach pains
muscles	large amounts may affect nerve endings (NOTE: This is a systemic effect that may occur after large dose through skin or inhalation or combination.)

TIME COURSE:

Onset of symptoms may be delayed- 2 to 36 hours; initial signs/symptoms are those of acute tracheobronchitis. Approximate time course for moderate exposure: 2-4 hours, chest tightness, hacking cough, hoarseness, sneezing; 4-16 hours, sinus pain, increased respiration rate 16-48 hours, severe cough, unable to speak, very rapid breathing; 24-48 hours, severe dyspnea, lung tissue hemorrhage, bronchopneumonia.

Adapted from F. R. Sidell, "Clinical Notes on Chemical Casualty Care," USAMRICD Technical Memorandum, 90-1 (1990).

Initial First Aid Treatment

Treatment must be immediate removal and decontamination, and airway management as necessary. There is no antidote. Prompt removal from site and immediate washing to dilute or remove the agent is recommended. When performing decontamination, pay special attention to skin creases (groin, armpits, behind ears, between fingers, etc.). These are the areas where the agent is most likely to cause severe blistering.

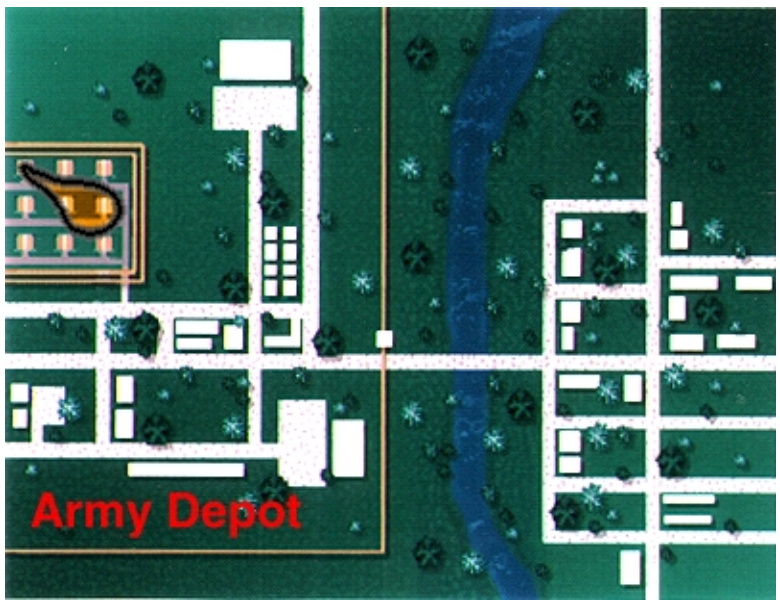
If agent has gotten into the eyes, speed in decontamination is especially critical. While the onset of blister agent effects on the skin may be delayed, irreversible damage may be done to the eyes very quickly. Flush eyes immediately with water by tilting the head to the side, pulling eyelids apart with fingers and pouring water slowly into the eyes. Do not cover eyes with bandages. Make sure that hands and fingers used are not contaminated with agent. If the eyes have been exposed to a blister agent the person may experience photophobia (sensitivity to light). Dark or opaque glasses help shield the eyes from the light and provide relief from photophobia.

Chemical Stockpile Emergency Preparedness Program (CSEPP)

CLASSIFICATION OF EVENTS

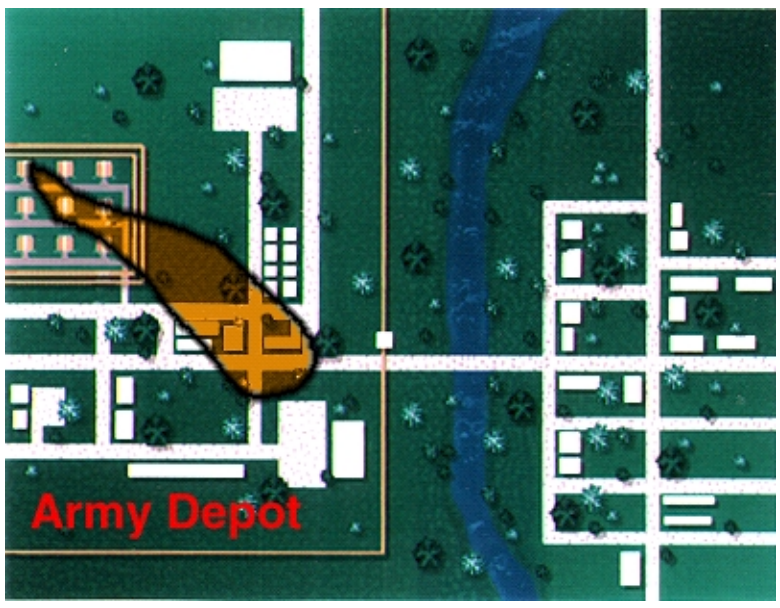
I. Non-Surety Emergency

Events are likely to occur that may be perceived as a chemical surety emergency or that may be of general public interest, but which impose no chemical surety hazard.



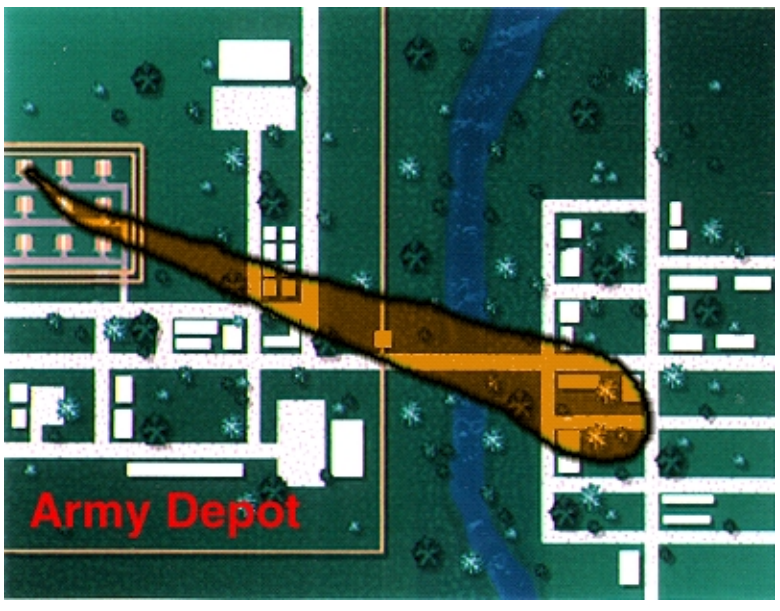
II. Limited Area Emergency

Events are likely to occur or have occurred that involve agent release outside engineering controls or approved chemical storage facilities with chemical effects expected to be confined to the chemical limited area.



III. Post Only Emergency

Events are likely to occur or have occurred that involve agent release with chemical effects beyond the chemical limited area. Releases are not expected to present a danger to the off-post public. Notification of IRZ, PAZ, and State-designated points of contact.



IV. Community Emergency

Events are likely to occur or have already occurred that involve agent release with chemical effects beyond the installation boundary. Notification of IRZ, PAZ, and State-designated points of contact. All emergency response organizations are mobilized. IRZ and affected PAZ areas implement specified protective actions.