

Risk Of: Daesh Chemical Weapons

Personal Protective Equipment for all RSAC Staff and Support Staff

Be prepared to protect yourself as a first responder or clinician.

- **GENERAL INFORMATION:** First Responders should use a NIOSH-certified Chemical, Biological, Radiological, Nuclear (CBRN) Self Contained Breathing Apparatus (SCBA) with a Level A protective suit when entering an area with an unknown contaminant or when entering an area where the concentration of the contaminant is unknown. Level A protection should be used until monitoring results confirm the contaminant and the concentration of the contaminant.
NOTE: Safe use of protective clothing and equipment requires specific skills developed through training and experience.
- **LEVEL A: (RED ZONE):** Select when the greatest level of skin, respiratory, and eye protection is required. This is the maximum protection for workers in danger of exposure to unknown chemical hazards or levels above the IDLH or greater than the AEGL-2.
 - A NIOSH-certified CBRN full-face-piece SCBA operated in a pressure-demand mode or a pressure-demand supplied air hose respirator with an auxiliary escape bottle.
 - A Totally-Encapsulating Chemical Protective (TECP) suit that provides protection against CBRN agents.
 - Chemical-resistant gloves (outer).
 - Chemical-resistant gloves (inner).
 - Chemical-resistant boots with a steel toe and shank.
 - Coveralls, long underwear, and a hard hat worn under the TECP suit are optional items.
- **LEVEL B: (RED ZONE):** Select when the highest level of respiratory protection is necessary but a lesser level of skin protection is required. This is the minimum protection for workers in danger of exposure to unknown chemical hazards or levels above the IDLH or greater than AEGL-2. It differs from Level A in that it incorporates a non-encapsulating, splash-protective, chemical-resistant splash suit that provides Level A protection against liquids but is not airtight.
 - A NIOSH-certified CBRN full-face-piece SCBA operated in a pressure-demand mode or a pressure-demand supplied air hose respirator with an auxiliary escape bottle.
 - A hooded chemical-resistant suit that provides protection against CBRN agents.
 - Chemical-resistant gloves (outer).
 - Chemical-resistant gloves (inner).
 - Chemical-resistant boots with a steel toe and shank.
 - Coveralls, long underwear, a hard hat worn under the chemical-resistant suit, and chemical-resistant disposable boot-covers worn over the chemical-resistant suit are optional items.

- **LEVEL C: (YELLOW ZONE):** Select when the contaminant and concentration of the contaminant are known and the respiratory protection criteria factors for using Air Purifying Respirators (APR) or Powered Air Purifying Respirators (PAPR) are met. This level is appropriate when decontaminating patient/victims.
 - A NIOSH-certified CBRN tight-fitting APR with a canister-type gas mask or CBRN PAPR for air levels greater than AEGL-2.
 - A NIOSH-certified CBRN PAPR with a loose-fitting face-piece, hood, or helmet and a filter or a combination organic vapor, acid gas, and particulate cartridge/filter combination or a continuous flow respirator for air levels greater than AEGL-1.
 - A hooded chemical-resistant suit that provides protection against CBRN agents.
 - Chemical-resistant gloves (outer).
 - Chemical-resistant gloves (inner).
 - Chemical-resistant boots with a steel toe and shank.
 - Escape mask, face shield, coveralls, long underwear, a hard hat worn under the chemical-resistant suit, and chemical-resistant disposable boot-covers worn over the chemical-resistant suit are optional items.
- **LEVEL D: (GREEN ZONE):** Select when the contaminant and concentration of the contaminant are known and the concentration is below the appropriate occupational exposure limit or less than AEGL-1 for the stated duration times.
 - Limited to coveralls or other work clothes, boots, and gloves.

Signs/Symptoms

- **TIME COURSE:** Exposure to nerve agents may be rapidly fatal. Eye exposure: Liquid soman produces health effects within seconds to minutes; larger exposures may cause death within 1 to 10 minutes. Ingestion exposure: No information is available on the time course of effects following ingestion of soman. Inhalation exposure: Inhaled soman produces health effects within seconds to minutes; larger exposures may cause death within 1 to 10 minutes. Skin exposure: Liquid soman may produce health effects within minutes. Health effects from mild to moderate exposure may be delayed up to 18 hours; larger exposures may cause death within minutes to hours.
- **EFFECTS OF SHORT-TERM (LESS THAN 8-HOURS) EXPOSURE:** Nerve agents cause the same health effects regardless of the route of exposure. Initial effects depend on the dose and route of exposure. Nerve agents interfere with the normal functioning of the nervous system. Skeletal muscles, certain organs of the body, and the central nervous system (CNS) may all be affected by exposure to nerve agent.
- **EYE EXPOSURE:**
 - Contracted or pinpoint pupils (miosis), redness of the membranes (conjunctiva), pain in and around the eye, dim and/or blurred vision, sensation of pressure with heaviness, reflex nausea and vomiting (emesis).
 - Effects are usually local, occurring from direct contact with nerve agent vapor, aerosol, or liquid, but exposure by other routes can also affect the eyes.
- **INGESTION EXPOSURE:**
 - Nausea, vomiting (emesis), diarrhea, abdominal pain, cramping.

- **INHALATION EXPOSURE:**
 - Mild to moderate: Contracted or pinpoint pupils (miosis), runny nose (rhinorrhea), narrowing of the large airways (bronchoconstriction), fluid accumulation within the airways of the lungs, and slight to moderate difficulty breathing or shortness of breath (dyspnea).
 - Severe: In addition to the symptoms described above, there can be loss of consciousness, seizures, muscular twitching (fasciculations), floppy (flaccid) paralysis, increased fluid accumulation within the airways and within the digestive tract, resulting in secretions from the nose and mouth, cessation of breathing (apnea), and death.
- **SKIN EXPOSURE:**
 - Mild to moderate: Health effects may be immediate or may be delayed up to 18 hours. Profuse sweating (diaphoresis) and muscular twitching (fasciculations) at the site of contact, nausea, vomiting (emesis), diarrhea, and weakness (malaise).
 - Severe: Health effects may appear quickly; 2 to 30 minutes post-exposure. In addition to the symptoms described above, there can be loss of consciousness, seizures, muscular twitching (fasciculations), floppy (flaccid) paralysis, increased fluid accumulation within the airways and within the digestive tract resulting in secretions from the nose and mouth, cessation of breathing (apnea), and death.

Decontamination

- **INTRODUCTION:** The purpose of decontamination is to make an individual and/or their equipment safe by physically removing toxic substances quickly and effectively. Care should be taken during decontamination, because absorbed agent can be released from clothing and skin as a gas. Your Incident Commander will provide you with decontaminants specific for the agent released or the agent believed to have been released.
- **DECONTAMINATION CORRIDOR:** The following are recommendations to protect the first responders from the release area:
 - Position the decontamination corridor upwind and uphill of the hot zone.
 - The warm zone should include two decontamination corridors. One decontamination corridor is used to enter the warm zone and the other for exiting the warm zone into the cold zone. The decontamination zone for exiting should be upwind and uphill from the zone used to enter.
 - Decontamination area workers should wear appropriate PPE. See the PPE section of this card for detailed information.
 - A solution of detergent and water (which should have a pH value of at least 8 but should not exceed a pH value of 10.5) should be available for use in decontamination procedures. Soft brushes should be available to remove contamination from the PPE.
 - Labeled, durable 6-mil polyethylene bags should be available for disposal of contaminated PPE.
- **INDIVIDUAL DECONTAMINATION:** The following methods can be used to decontaminate an individual:
 - Decontamination of First Responder:

- Begin washing PPE of the first responder using soap and water solution and a soft brush. Always move in a downward motion (from head to toe). Make sure to get into all areas, especially folds in the clothing. Wash and rinse (using cold or warm water) until the contaminant is thoroughly removed.
- Remove PPE by rolling downward (from head to toe) and avoid pulling PPE off over the head. Remove the SCBA after other PPE has been removed.
- Place all PPE in labeled durable 6-mil polyethylene bags.
- Decontamination of Patient/Victim:
 - Remove the patient/victim from the contaminated area and into the decontamination corridor.
 - Remove all clothing (at least down to their undergarments) and place the clothing in a labeled durable 6-mil polyethylene bag.
 - Thoroughly wash and rinse (using cold or warm water) the contaminated skin of the patient/victim using a soap and water solution. Be careful not to break the patient/victim's skin during the decontamination process, and cover all open wounds.
 - Cover the patient/victim to prevent shock and loss of body heat.
 - Move the patient/victim to an area where emergency medical treatment can be provided.

RSAC Responder Treatment - Nerve Gas Patient

1. **GENERAL INFORMATION:** Initial treatment consists of repeated administration of antidotes and supportive measures.
2. **ANTIDOTE:** Atropine and pralidoxime chloride (2-PAM Cl) are antidotes for nerve agent toxicity; however, 2-PAM Cl must be administered within minutes to a few hours (depending on the agent) following exposure to be effective. There is also generally no benefit in giving more than three injections of 2-PAM Cl. Atropine should be administered every 5 to 10 minutes until secretions begin to dry up. If the military Mark I kits containing autoinjectors are available, they provide the best way to administer the antidotes to healthy adults. One autoinjector automatically delivers 2 mg atropine and the other automatically delivers 600 mg 2-PAM Cl. If the Mark I kit is unavailable, or the patient/victim is not an otherwise healthy adult, administer antidotes as described below:
3. **Infant (0 – 2 yrs), for mild to moderate physical findings,** including localized sweating, muscular twitching (fasciculations), nausea, vomiting, weakness, and shortness of breath (dyspnea); administer Atropine at 0.05 mg/kg IM; 2-PAM Cl at 15 mg/kg IM.
4. **Infant (0 – 2 yrs), for severe physical findings,** including unconsciousness, convulsions, cessation of breathing (apnea), and floppy (flaccid) paralysis; administer Atropine at 0.1 mg/kg IM; 2-PAM Cl at 25 mg/kg IM.
5. **Child (2 – 10 yrs), for mild to moderate physical findings,** including localized sweating, muscular twitching (fasciculations), nausea, vomiting, weakness, and shortness of breath (dyspnea); administer Atropine at 1 mg/kg IM; 2-PAM Cl at 15 mg/kg IM.

6. **Child (2 – 10 yrs), for severe physical findings**, including unconsciousness, convulsions, cessation of breathing (apnea), and floppy (flaccid) paralysis; administer Atropine at 2 mg/kg IM; 2-PAM Cl at 25 mg/kg IM.
7. **Adolescent (> 10 yrs), for mild to moderate physical findings**, including localized sweating, muscular twitching (fasciculations), nausea, vomiting, weakness, and shortness of breath (dyspnea); administer Atropine at 2 mg/kg IM; 2-PAM Cl at 15 mg/kg IM.
8. **Adolescent (> 10 yrs), for severe physical findings**, including unconsciousness, convulsions, cessation of breathing (apnea), and floppy (flaccid) paralysis; administer Atropine at 4 mg IM; 2-PAM Cl at 25 mg/kg IM.
9. **Adult, for mild to moderate physical findings**, including localized sweating, muscular twitching (fasciculations), nausea, vomiting, weakness, and shortness of breath (dyspnea); administer Atropine at 2 to 4 mg IM; 2-PAM Cl at 600 mg IM.
10. **Adult, for severe physical findings**, including unconsciousness, convulsions, cessation of breathing (apnea), and floppy (flaccid) paralysis; administer Atropine at 6 mg IM; 2-PAM Cl at 1800 mg IM.
11. **Elderly, frail for mild to moderate physical findings**, including localized sweating, muscular twitching (fasciculations), nausea, vomiting, weakness, and shortness of breath (dyspnea); administer Atropine at 1 mg IM; 2-PAM Cl at 10 mg/kg IM.
12. **Elderly, frail for severe physical findings**, including unconsciousness, convulsions, cessation of breathing (apnea), and floppy (flaccid) paralysis; administer Atropine at 2 to 4 mg IM; 2-PAM Cl at 25 mg/kg IM.
Assisted ventilation should be started after administration of antidotes for severe exposures.
13. **Repeat atropine (2 mg IM for adults or 0.05 to 0.1 mg/kg for children)** at 5 to 10 minute intervals until secretions have diminished and breathing is comfortable or airway resistance has returned to near normal.

EYE:

- Immediately remove the patient/victim from the source of exposure.
- Often the first physical finding of minimal symptomatic exposure to nerve agent vapor is markedly constricted pupils (miosis); however, if this is the only physical finding of nerve agent exposure, do not administer antidotes but follow the instructions below.
- When exposed to liquid nerve agent, immediately flush the eyes with water for about 5 to 10 minutes by tilting the head to the side, pulling the eyelids apart with fingers, and pouring water slowly into eyes.
- When exposed to nerve agent vapor, there is no need to flush the eyes.
- Do not cover eyes with bandages.
- Changes in the eye can lead to nausea and vomiting without necessarily being a sign of systemic exposure. However, if eye pain, nausea, or vomiting are seen in combination with any other physical findings of nerve agent poisoning, administer antidotes atropine and 2-PAM Cl as directed.
- Seek medical attention immediately.

INGESTION:

- Immediately remove the patient/victim from the source of exposure.
- Ensure that the patient/victim has an unobstructed airway.
- Do not induce vomiting (emesis).
- Administer nothing by mouth (NPO).
- If the patient/victim's condition can be evaluated within 30 minutes after ingestion, in a hospital setting, consider gastric lavage. Gastric contents should be considered potentially hazardous and should be quickly isolated.
- Be alert to physical findings of systemic exposure, and administer antidotes as required.
- Maintain records of all injections given.
- Seek medical attention immediately.

INHALATION:

- Immediately remove the patient/victim from the source of exposure.
- In cases of moderate to severe exposure, antidotes alone will not provide effective treatment, and ventilatory support is essential.
- Evaluate respiratory function and pulse.
- Ensure that the patient/victim has an unobstructed airway.
- Assist with ventilation as required. Do not provide mouth-to-mouth resuscitation. Contact with off-gassed vapor or with liquid agent may occur.
- If shortness of breath occurs, or breathing is difficult (dyspnea), administer oxygen.
- Suction secretions from the nose, mouth, and respiratory tract.
- Marked resistance to ventilation is expected due to bronchial constriction and spasm. Resistance lessens after administration of atropine.
- Ventilatory distress is a physical finding of systemic exposure and requires antidote administration.
- Maintain records of all injections given.
- Seek medical attention immediately.

SKIN:

- Immediately remove the patient/victim from the source of exposure.
- Some nerve agents may remain in the hair or clothing and should be decontaminated, if that was not previously done. See the decontamination section of this card.
- Skin exposure to liquid nerve agents will not necessarily result in systemic exposure if the site of exposure is decontaminated promptly. Before administering nerve agent antidotes, observe the site of exposure for localized sweating and muscular twitching. If these physical findings appear, administer antidotes; otherwise careful observation is all that is needed.
- Maintain records of all injections given.
- Seek medical attention immediately.

See USA ATSDR Medical Management Guidelines for Nerve Agents for more detailed recommendations, <http://www.atsdr.cdc.gov/MHMI/mmg166.pdf>.

Long-Term Implications

- **MEDICAL TREATMENT:** Electrocardiogram (ECG), and adequacy of respiration and ventilation, should be monitored. Supplemental oxygenation, frequent suctioning of secretions, insertion of a tube into the trachea (endotracheal intubation), and assisted ventilation may be required. Diazepam (5 to 10 mg in adults and 0.2 to 0.5 mg/kg in children) may be used to control convulsions. Lorazepam or other benzodiazepines may be used, but barbiturates, phenytoin, and other anticonvulsants are not effective. Administration of atropine (if not already given) should precede the administration of benzodiazepines in order to best control seizures. Patients/victims who have inhalation exposure and who complain of chest pain, chest tightness, or cough should be observed and examined periodically for 6 to 12 hours to detect delayed-onset inflammation of the large airways (bronchitis), inflammatory lung disease (pneumonia), accumulation of fluid in the lungs (pulmonary edema), or respiratory failure.
- **DELAYED EFFECTS OF EXPOSURE:** Patients/victims who have severe exposure should be evaluated for persistent central nervous system (CNS) effects.
- **EFFECTS OF CHRONIC OR REPEATED EXPOSURE:** Limited data are available on chronic or repeated exposure to soman. The available data however, suggest that soman is not a human carcinogen, reproductive toxin, or developmental toxin. Limited data suggest that chronic or repeated exposure to soman may result in a delayed postural sway and/or impaired psychomotor performance (neuropathy).

On-Site Fatalities

- **INCIDENT SITE:**
 - Consult with the RSAC Incident Commander regarding the agent dispersed, dissemination method, level of PPE required, location, geographic complications (if any), and the approximate number of remains.
 - Coordinate responsibilities and prepare to enter the scene as part of the evaluation team along with the FBI HazMat Technician, local law enforcement evidence technician, and other relevant personnel.
 - Begin tracking remains using waterproof tags.
- **RECOVERY AND ON-SITE MORGUE:**
 - Wear PPE until all remains are deemed free of contamination.
 - Establish a preliminary (holding) morgue.
 - Gather evidence, and place it in a clearly labeled impervious container. Hand any evidence over to the FBI.
 - Remove and tag personal effects.
 - Perform a thorough external evaluation and a preliminary identification check.
 - See the Decontamination section for decontamination procedures.
 - Decontaminate remains before they are removed from the incident site.

	10 min	30 min	60 min	4 hr	8 hr
AEGL 1 (discomfort, non-disabling) - ppm [mg/m ³]	0.00046 [0.0035]	0.00026 [0.0020]	0.00018 [0.0014]	0.000091 [0.00070]	0.000065 [0.00050]
AEGL 2 (irreversible or other serious, long-lasting effects or impaired ability to escape) - ppm [mg/m ³]	0.0057 [0.044]	0.0033 [0.025]	0.0022 [0.018]m	0.0012 [0.0085]	0.00085 [0.0065]
AEGL 3 (life-threatening effects or death) - ppm [mg/m ³]	0.049 [0.38]	0.025 [0.19]	0.017 [0.13]	0.0091 [0.070]	0.0066 [0.051]

[Technical Support Document \(Pages 1-88\)](#)
[Technical Support Document \(Pages 89-194\)](#)
[Technical Support Document \(Pages 195-300\)](#)

All Agents: Categorized

Biotoxins

- [ABRIN](#)
- [COLCHICINE](#)
- [RICIN](#)
- [STRYCHNINE](#)

- [TETRODOTOXIN](#)

Blister Agents

- [LEWISITE \(L\)](#)
- [MUSTARD-LEWISITE MIXTURE \(HL\)](#)
- [NITROGEN MUSTARD HN-1](#)
- [NITROGEN MUSTARD HN-2](#)
- [NITROGEN MUSTARD HN-3](#)
- [PHOSGENE OXIME \(CX\)](#)
- [SULFUR MUSTARD](#)

Incapacitating Agents

- [FENTANYL](#)
- [QNB](#)

Lung Damaging Agents

- [AMMONIA SOLUTION \(UN 3318\); AMMONIA, ANHYDROUS \(UN 1005\)](#)
- [CHLORINE](#)
- [CHLOROPICRIN \(PS\)](#)
- [MERCURY \(ELEMENTAL\)](#)
- [PHOSGENE \(CG\)](#)
- [PHOSPHINE](#)

Nerve Agents

- [SARIN \(GB\)](#)
- [SOMAN \(GD\)](#)
- [TABUN \(GA\)](#)
- [VX](#)

Riot Control/Tear Agents

- [CHLOROACETOPHENONE \(CN\)](#)

Systemic Agents

- [ARSENIC PENTOXIDE](#)
- [ARSINE \(SA\)](#)
- [BENZENE](#)
- [CYANOGEN CHLORIDE \(CK\)](#)
- [ETHYLENE GLYCOL](#)

- HYDROGEN CYANIDE (AC)
- HYDROGEN FLUORIDE/ HYDROFLUORIC ACID
- METHANOL
- NICOTINE
- POTASSIUM CYANIDE
- SODIUM AZIDE
- SODIUM CYANIDE
- THALLIUM
- WHITE PHOSPHORUS

Vomiting Agents

- ADAMSITE (DM)