Irritating Materials
UN Class 6

SUBSTANCE IDENTIFICATION
A liquid or solid substance that, on contact with fire or when exposed to air, gives off dangerous or intensely irritating fumes, but no poisonous material. Examples: tear gas, CS/CN gas, xylyl bromide, phenacyl chloride, and chemical mace.

ROUTES OF EXPOSURE
Skin and eye contact
Inhalation
Ingestion

LIFE THREAT
Respiratory tract irritants can cause a severe, delayed pulmonary edema, or immediate upper airway irritation and edema.

SIGNS AND SYMPTOMS BY SYSTEM
Cardiovascular: Cardiovascular collapse with a rapid and weak pulse. Can show a reflex bradycardia.
Respiratory: With most agents, a mild and transient cough is the only symptom at the time of exposure. Symptoms may be self-limited in mild exposures. A delayed onset of dyspnea, rapid respirations, violent coughing, and pulmonary edema may follow. Some agents work immediately on the upper airway, resulting in pain and choking and spasm of the glottis (resulting in a temporary reflex arrest of breathing). Severe exposures may cause upper airway obstruction from glottic spasm.
CNS: Fatigue, restlessness, and decreasing LOC are usually delayed signs.
Gastrointestinal: Burning of the mucous membranes, nausea, vomiting, and abdominal pain.
Eye: Chemical conjunctivitis.
Skin: Irritation of the skin, especially mucous membranes, pallor, and cyanosis.
Other: With most products, symptoms will be delayed for 5 to 72 hours. Certain products or high concentrations can bring on symptoms immediately.

DECONTAMINATION
- Wear positive-pressure SCBA and protective equipment specified by references such as the DOT Emergency Response Guidebook or the CANUTEC Initial Emergency Response Guide. If special chemical protective clothing is required, consult the chemical manufacturer or specific protective clothing compatibility charts.
- Delay entry until trained personnel and proper protective equipment are available.
- Remove patient from contaminated area.
- Quickly remove and isolate patient’s clothing, jewelry, and shoes.
- Gently brush away dry particles and blot excess liquids with absorbent material.
- Rinse patient with warm water, 30°C/86°F, if possible.
- Wash patient with Tincture of Green soap or a mild liquid soap and large quantities of water.
- Refer to decontamination protocol in Section Three.
IMMEDIATE FIRST AID
- Ensure that adequate decontamination has been carried out.
- If victim is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask as trained. Perform CPR as necessary.
- Immediately flush contaminated eyes with gently flowing water.
- Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.
- Keep victim quiet and maintain normal body temperature.
- Obtain medical attention.

BASIC TREATMENT
- Establish a patent airway. Suction if necessary.
- Encourage patient to take deep breaths.
- Watch for signs of respiratory insufficiency and assist ventilations if necessary.
- Administer oxygen by nonrebreather mask at 10 to 15 L/min.
- Monitor for pulmonary edema and treat if necessary (refer to pulmonary edema protocol in Section Three).
- Monitor for shock and treat if necessary (refer to shock protocol in Section Three).
- Anticipate seizures and treat if necessary (refer to seizure protocol in Section Three).
- For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport (refer to eye irrigation protocol in Section Three).
- Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool (refer to ingestion protocol in Section Three).

ADVANCED TREATMENT
- Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in respiratory arrest. Early intubation at the first sign of upper airway obstruction may be necessary.
- Positive-pressure ventilation techniques with a bag-valve mask device may be beneficial.
- Monitor cardiac rhythm and treat arrhythmias if necessary (refer to cardiac protocol in Section Three).
- Start an IV with D\textsubscript{5}W TKO. Use lactated Ringer’s if signs of hypovolemia are present. Watch for signs of fluid overload.
- Consider drug therapy for pulmonary edema (refer to pulmonary edema protocol in Section Three).
- Treat seizures with diazepam (Valium) (refer to diazepam protocol in Section Four.)
- Use proparacaine hydrochloride to assist eye irrigation (refer to proparacaine hydrochloride protocol in Section Four).

SPECIAL CONSIDERATIONS
- In most cases of mild exposure, symptoms are self-limited and require supportive management only. Use of medications such as atropine, epinephrine, expectorants, and sedatives are not indicated and may cause further damage.
- Treat severe symptomatic exposures as required.
Poisons A and B
UN Class 2 and 6

SUBSTANCE IDENTIFICATION
Poisonous gases, liquids, or other substances of such nature that exposure to a very small amount of the gas, vapor, liquid, or solid is dangerous to life or presents a health hazard. Examples: cyanide, arsenic, phosgene, aniline, methyl bromide, and various insecticides/pesticides. Products may be very toxic.

ROUTES OF EXPOSURE
Skin and eye contact
Inhalation
Ingestion
Skin absorption

LIFE THREAT
Cardiovascular collapse, pulmonary edema, CNS depression, and cardiopulmonary arrest. These poisons have a variety of actions and life threats. Generalized symptoms are listed, but symptoms may vary markedly from product to product.

SIGNS AND SYMPTOMS BY SYSTEM
Cardiovascular: Cardiovascular collapse, arrhythmias, and cardiac arrest.
Respiratory: Acute pulmonary edema, dyspnea, stridor, tachypnea, bronchospasm with wheezing and other reactive airway symptoms, and respiratory arrest.
CNS: CNS depression, coma, and seizures.
Gastrointestinal: Nausea, vomiting, diarrhea (sometimes bloody), and abdominal pain.
Eye: Chemical conjunctivitis, corneal burns and opacification. Profuse lacrimation may occur.
Skin: Irritation and chemical burns.
Other: Some products may result in a syndrome of salivation, lacrimation, urination, defecation, GI pain, and emesis (SLUDGE syndrome). Others may cause methemoglobinemia or interfere with cellular respiration (oxidative phosphorylation).

DECONTAMINATION
- Wear positive-pressure SCBA and protective equipment specified by references such as the DOT Emergency Response Guidebook or the CANUTEC Initial Emergency Response Guide. If special chemical protective clothing is required, consult the chemical manufacturer or specific protective clothing compatibility charts. Flash protection may be necessary.
- Delay entry until trained personnel and proper protective equipment are available.
- Remove patient from contaminated area.
- Quickly remove and isolate patient’s clothing, jewelry, and shoes.
- Gently brush away dry particles and blot excess liquids with absorbent material.
- Rinse patient with warm water, 30° C/86° F, if possible.
- Wash patient with Tincture of Green soap or a mild liquid soap and large quantities of water.
- Refer to decontamination protocol in Section Three.
IMMEDIATE FIRST AID

- Ensure that adequate decontamination has been carried out.
- If victim is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask as trained. Perform CPR if necessary.
- Immediately flush contaminated eyes with gently flowing water.
- Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.
- Keep victim quiet and maintain normal body temperature.
- Obtain medical attention.

BASIC TREATMENT

- Establish a patent airway. Suction if necessary.
- Watch for signs of respiratory insufficiency and assist ventilations if needed.
- Administer oxygen by nonrebreather mask at 10 to 15 L/min.
- Monitor for pulmonary edema and treat if necessary (refer to pulmonary edema protocol in Section Three).
- Monitor for shock and treat if necessary (refer to shock protocol in Section Three).
- Anticipate seizures and treat if necessary (refer to seizure protocol in Section Three).
- For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport (refer to eye irrigation protocol in Section Three).
- Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool (refer to ingestion protocol in Section Three).
- Cover skin burns with dry sterile dressings after decontamination (refer to chemical burn protocol in Section Three).

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in respiratory arrest.
- Positive-pressure ventilation techniques with a bag-valve-mask device may be beneficial.
- Monitor cardiac rhythm and treat arrhythmias as necessary (refer to cardiac protocol in Section Three).
- Start an IV with D5W TKO. Use lactated Ringer’s if signs of hypovolemia are present. Watch for signs of fluid overload.
- Consider drug therapy for pulmonary edema (refer to pulmonary edema protocol in Section Three).
- For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload (refer to shock protocol in Section Three).
- Treat seizures with diazepam (Valium) (refer to diazepam protocol in Section Four).
- Use proparacaine hydrochloride to assist eye irrigation (refer to proparacaine hydrochloride protocol in Section Four).
Etiological Agents
UN Class 6

SUBSTANCE IDENTIFICATION
Viable microorganisms or their toxins that may cause disease in humans or animals. Examples: anthrax, rabies, tetanus, botulism, polio, and HIV specimens.

ROUTES OF EXPOSURE
Inhalation
Ingestion
Skin absorption

LIFE THREAT
These etiological agents have a variety of actions and life threats. Most have an incubation period and no acute symptoms. Identification of the product is essential to determine severity of expected symptoms.

DECONTAMINATION
• Wear positive-pressure SCBA and protective equipment specified by references such as the DOT Emergency Response Guidebook or the CANUTEC Initial Emergency Response Guide. If special chemical protective clothing is required, consult the chemical manufacturer or specific protective clothing compatibility charts.
• Delay entry until trained personnel and proper protective equipment are available.
• Remove patient from contaminated area.
• Quickly remove and isolate patient’s clothing, jewelry, and shoes.
• Gently brush away dry particles and blot excess liquids with absorbent material.
• Rinse patient with warm water, 30° C/86° F, if possible.
• Wash patient with Tincture of Green soap or a mild liquid soap and large quantities of water.
• Refer to decontamination protocol in Section Three.

IMMEDIATE FIRST AID
• Ensure that adequate decontamination has been carried out.
• If victim is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask as trained. Perform CPR as necessary.
• Immediately flush contaminated eyes with gently flowing water.
• Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.
• Keep victim quiet and maintain normal body temperature.
• Obtain medical attention.

BASIC TREATMENT
• Establish a patent airway. Suction if necessary.
• Watch for signs of respiratory insufficiency and assist ventilations if needed.
• Administer oxygen by nonrebreather mask at 10 to 15 L/min.
• For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport (refer to eye irrigation protocol in Section Three).
ADVANCED TREATMENT
- Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or in respiratory arrest.
- Monitor cardiac rhythm and treat arrhythmias if necessary (refer to cardiac protocol in Section Three).
- Start an IV with D₂W TKO.
- Proparacaine hydrochloride should be used to assist eye irrigation (refer to proparacaine hydrochloride protocol in Section Four).

SPECIAL CONSIDERATIONS
- Symptomatic and supportive care should be started immediately.
- Product identification is essential for specific therapy. Most toxins have incubation periods of varying length with no or few acute symptoms.
- Most exposures require little or no immediate treatment.
- Transport to hospital. Observe universal precautions.
Radioactives I, II, and III
UN Class 7

SUBSTANCE IDENTIFICATION:
Any material or combination of materials that spontaneously emit ionizing radiation and have a specific activity greater than 0.002 μCi/g. Examples: plutonium, cobalt uranium 235, and radioactive waste. Patients exposed to electromagnetic radiation sources emitting gamma rays will be irradiated. These patients are not contaminated and do not pose a secondary contamination risk. Conversely, exposure to particle radiation sources (alpha and beta particles, neutrons, protons, and positrons) in the form of dusts, liquids, or gases contaminates the patient and presents a secondary contamination risk unless properly handled.

ROUTES OF EXPOSURE
Skin and eye contact
Inhalation
Ingestion
Skin absorption
Proximity exposure risk with certain products

LIFE THREAT
Radiation ionizes atoms, resulting in intracellular formation of free radicals that damage DNA and RNA. Cells with high metabolic turnover rates such as those in the GI tract and hematopoietic system are affected the most. Massive radiation exposures may result in extensive neurologic and GI damage. Loss of bone marrow function may also occur with resulting immunocompromise and systemic infection. Soluble radioactive compounds may cause local symptoms as well. Products may act as carcinogens.

SIGNS AND SYMPTOMS BY SYSTEM
Cardiovascular: Tachycardia and cardiovascular collapse.
Respiratory: Dyspnea, cough with irritation and edema to the upper airway, and pneumonia.
CNS: Decreased level of consciousness and coma, ataxia, headache, lethargy, weakness, tremors, and convulsions.
Gastrointestinal: Nausea, vomiting, and diarrhea.
Eye: Lacrimation, conjunctivitis, and corneal damage.
Skin: Symptoms range from mild irritation to burns. Hair loss.
Blood: Bone marrow suppression.
Other: In most cases symptoms are delayed for hours to days.

DECONTAMINATION
• Wear positive-pressure SCBA and protective equipment specified by references such as the DOT Emergency Response Guidebook or the CANUTEC Initial Emergency Response Guide. If special chemical protective clothing is required, consult the chemical manufacturer or specific protective clothing compatibility charts.
• In a transportation accident, if a small quantity of radioactive material (such as a medical imaging isotope) is the only significant hazardous materials threat involved, immediate rescue and lifesaving care may be carried out, taking all reasonable
precautions to avoid contact with the radioactive materials or their containers. The time responders spend in any potentially contaminated area should be kept to a minimum. Although some risk is present from the release of radioactive materials, history has shown that transportation accidents involving releases usually are small-quantity shipments unlikely to pose a life-threatening health hazard to responders. Patient risk caused by trauma is much greater.

- Remove patient from contaminated area.
- If it is known or highly suspected that a high-level radiation exposure (such as a large-quantity shipment with a container breach or a large release in a fixed facility) would be incurred, responders should delay entry until properly trained and equipped personnel are on scene. Complete patient decontamination procedures should be instituted.

- **Patients with electromagnetic radiation (gamma) exposure require no further decontamination.** For patients with life-threatening injuries (from incidents involving small quantity releases) and particle or liquid exposure, follow the remainder of the decontamination guide.

- Quickly remove and isolate patient’s clothing, jewelry, and shoes.
- Package the patient, using reverse isolation procedures such as transportation bags, plastic, or blankets. This helps prevent the spread of contamination during transport.
- Provide adequate ambulance ventilation (intake and exhaust fans of proper size).
- Use adequate personnel protective equipment. See EMS/Hazardous Materials Equipment Procedure in Section Five.
- Notify the emergency department that a potentially contaminated patient is enroute and supply them with all available information concerning the identity and nature of the contaminant.

- **If high levels of radioactive contamination are present or other chemical contaminants are suspected:**
  - Gently brush away dry particles and blot excess liquids with absorbent material.
  - Rinse patient with warm water, 30°C/86°F, if possible. Use caution not to rinse contamination to areas of tissue damage or body cavity openings.
  - Wash patient with Tincture of Green soap or a mild liquid soap and large quantities of water.
  - Refer to decontamination protocol in Section Three.

**IMMEDIATE FIRST AID**

- Ensure that adequate decontamination has been carried out.
- If not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask as trained. Perform CPR if necessary.
- Immediately flush contaminated eyes with gently flowing water.
- Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.
- Keep victim quiet and maintain normal body temperature.
- Obtain medical attention.

**BASIC TREATMENT**

- Establish a patent airway. Suction if necessary.
- Watch for signs of respiratory insufficiency and assist ventilations if necessary
- Administer oxygen by nonrebreather mask at 10 to 15 L/min.
- Monitor for shock and treat if necessary (refer to shock protocol in Section Three).
- Anticipate seizures and treat if necessary (refer to seizure protocol in Section Three).
• Perform routine emergency care for associated injuries.

• For eye contamination, flush eyes immediately with water. Irrigate each eye continuously during transport (refer to eye irrigation protocol in Section Three).

• Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a good gag reflex, and does not drool (refer to ingestion protocol in Section Three).

• Perform routine BLS care as necessary.

ADVANCED TREATMENT

• Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or in respiratory arrest.

• Monitor cardiac rhythm and treat arrhythmias as necessary (refer to cardiac protocol in Section Three).

• Start an IV with lactated Ringer’s to support vital signs.

• For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload (refer to shock protocol in Section Three).

• Treat seizures with diazepam (Valium) (refer to diazepam protocol in Section Four).

• Perform routine advanced life support care as needed.

• Use proparacaine hydrochloride to assist eye irrigation (refer to proparacaine hydrochloride protocol in Section Four).

INITIAL EMERGENCY DEPARTMENT CONSIDERATIONS

• Chelating agents or pharmacologic blocking drugs (potassium iodine, DTPA, BAL, bicarbonate, Prussian blue, calcium gluconate, ammonium chloride, barium sulfate, sodium alginate, d-penicillamine) may be useful if given before or immediately after exposure. The Oak Ridge number listed at the end of this guideline can be contacted for specific treatment advice.

SPECIAL CONSIDERATIONS

• Most symptoms from radioactive product exposure are delayed; treat other medical or trauma problems according to normal protocols.

• An accurate history of the exposure is essential to determine risk and proper treatment modalities.

• The dose of radiation determines the type and clinical course of exposure:

  • 100 rads: GI symptoms (nausea, vomiting, abdominal cramps, diarrhea). Symptom onset within a few hours.

  • 600 rads: Severe GI symptoms (necrotic gastroenteritis) may result in dehydration and death within a few days.

  • Several thousand rads: neurologic/cardiovascular symptoms (confusion, lethargy, ataxia, seizures, coma, cardiovascular collapse) within minutes to hours. Bone marrow depression, leukopenia, and infections usually follow severe exposures.

• Assistance and advice on patient care concerns may be obtained from the Oak Ridge Radiation Emergency Assistance Center and Training Site 24 hours a day by calling (615) 576-3131 or (615) 481-1000, ext. 1502 or beeper 241.
Corrosives
UN Class 8

SUBSTANCE IDENTIFICATION
Any liquid or solid that causes visible destruction of human skin tissue or has a severe corrosion rate on steel or aluminum. The Environmental Protection Agency (EPA) defines a corrosive product as having a pH of 2 or less or 12.5 or more. This group includes both acids and bases. Some products may cause systemic toxicity. Examples: hydrochloric acid, sulfuric acid, hydrofluoric acid, sodium hydroxide (lye), and caustic potash.

ROUTES OF EXPOSURE
Skin and eye contact
Inhalation
Ingestion

LIFE THREAT
Severe irritant to tissue that can cause upper airway burns and edema, circulatory collapse, and severe skin burns. May cause GI perforation, hemorrhage, and peritonitis. Absorption of some products may cause toxic systemic effects.

SIGNS AND SYMPTOMS BY SYSTEM
Cardiovascular: Tachycardia and shock.
Respiratory: Dyspnea, tachypnea, burns and edema in the upper airway, sneezing, coughing, stridor, and pulmonary edema.
CNS: Apathy, mental confusion, blurred vision, and tremors.
Gastrointestinal: Nausea; vomiting; hemorrhage; abdominal pain; painful swallowing; profuse salivation; and burns to the mouth, esophagus, stomach, and lower GI tract.
Eye: Chemical conjunctivitis to severe eye damage.
Skin: Chemical burns, skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

DECONTAMINATION
- Wear positive-pressure SCBA and protective equipment specified by references such as the DOT Emergency Response Guidebook or the CANUTEC Initial Emergency Response Guide. If special chemical protective clothing is required, consult the chemical manufacturer or specific protective clothing compatibility charts.
- Delay entry until trained personnel and proper protective equipment are available.
- Remove patient from contaminated area.
- Quickly remove and isolate patient’s clothing, jewelry, and shoes.
- Gently brush away dry particles and blot excess liquids with absorbent material.
- Rinse patient with warm water, 30°C/86°F, if possible.
- Wash patient with Tincture of Green soap or a mild liquid soap and large quantities of water.
- Refer to decontamination protocol in Section III.

IMMEDIATE FIRST AID
- Ensure that adequate decontamination has been carried out.
- If victim is not breathing, start artificial respiration, preferably with a demand-valve
Corrosives

- resuscitator, bag-valve-mask device, or pocket mask as trained. Perform CPR as necessary.
- Immediately flush contaminated eyes with gently flowing water.
- Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.
- Keep victim quiet and maintain normal body temperature.
- Obtain medical attention.

**BASIC TREATMENT**
- Establish a patent airway. Suction if necessary.
- Watch for signs of respiratory insufficiency and assist ventilations if necessary.
- Administer oxygen by nonrebreather mask at 10 to 15 L/min.
- Monitor for pulmonary edema and treat if necessary (refer to pulmonary edema protocol in Section Three).
- Monitor for shock and treat if necessary (refer to shock protocol in Section Three).
- Anticipate seizures and treat if necessary (refer to seizure protocol in Section Three).
- For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport (refer to eye irrigation protocol in Section Three).
- Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool (refer to ingestion protocol in Section Three).
- Cover skin burns with dry sterile dressings after decontamination (refer to chemical burn protocol in Section Three).

**ADVANCED TREATMENT**
- Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in respiratory arrest. Early intubation, at the first sign of upper airway obstruction, may be necessary.
- Positive-pressure ventilation techniques with a bag-valve mask device may be beneficial.
- Monitor cardiac rhythm and treat arrhythmias if necessary (refer to cardiac protocol in Section Three).
- Start an IV with D5W TKO. Use lactated Ringer’s if signs of hypovolemia are present. Watch for signs of fluid overload.
- Consider drug therapy for pulmonary edema (refer to pulmonary edema protocol in Section Three).
- For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload (refer to shock protocol in Section Three).
- Treat seizures with diazepam (Valium) (refer to diazepam protocol in Section Four).
- Use proparacaine hydrochloride to assist eye irrigation (refer to proparacaine hydrochloride protocol in Section Four).

**SPECIAL CONSIDERATIONS**
- Do not attempt to neutralize products because of exothermic reaction.