SECTION FIVE

EMS/HAZARDOUS MATERIALS OPERATING PROCEDURES

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Unless otherwise stated, all treatment modalities and drug dosages in this section are based on the adult patient. For pediatric patients, consult the drug protocol section and your medical advisor.

To the best of our knowledge, drug indications, dosages and precautions contained in these protocols are correct and current as of the time of publication. The reader is urged to review standard pharmacology references and the manufacturer's recommendations for additional details.

These protocols contain suggested treatment. Operating protocols and standing and verbal orders should be established by the local medical advisor. Consult with your medical control physician concerning local medication protocols.
Preplanning Concerns

HEALTH STATUS OF THE MEDICAL RESPONDER
- Previous poisoning exposure.
- Preexisting medical conditions.
- Reproductive hazard exposure concerns (e.g., lead).

PREPLANNING QUESTIONS
- Who has jurisdiction?
- What is the local type of incident command system (ICS) structure? How does EMS fit in?
- Capabilities of local responders
  - Fire
  - Hazmat
  - Police
  - Health Department
  - Public Utilities
- Responder response time?
- Local hospital capabilities?
  - Decontamination capabilities
  - Medical toxicology support
  - Special drug/equipment availability (e.g., physiological antagonists, hyperbaric chamber)
- Types of area hazards?
- Types of hazards transported through area?
- From whom is decontamination advice available?

INFORMATION SOURCES
- Local Emergency Planning Committee (LEPC)
- SARA Title III reports
- Fire department inspections
- Fire department reports (previous product releases and problems)
- Police or State Patrol records
- Local industry representatives

EQUIPMENT
- Compatible with area hazards
- Protective equipment
- Disposable equipment
- Resources
- Physiological antagonists and special treatment protocols
- Location of extra supplies
- Inventory checklists

OPERATING PROCEDURES
- Response procedures and checklists
- Treatment protocols
- Destination protocols
- Decontamination protocols
Scene Operations and Response

SCENE MANAGEMENT

- Advance cautiously at the first indication that hazardous materials are involved; make sure that your approach is from an upwind and uphill direction. Stop a safe distance from the contaminated or potentially contaminated area.
- Isolate the hazard area and secure from unauthorized personnel entry.
- Establish a safe zone that is upwind and uphill (if possible). Avoid low-lying areas. Keep unnecessary people away (including nonessential emergency response personnel).
- Isolation and evacuation distances vary depending on chemical/product, weather, and situation. Suggested evacuation distances can be found in the DOT Emergency Response Guidebook and the CANUTEC Initial Emergency Response Guide.
- Do not assume that the scene is safe because the substance does not have any apparent odor or obvious color.
- Call for help from local authorities (e.g., police, fire, hazmat team, local or state Health Dept).
- Attempt to identify the products involved by occupancy/location, container shape, markings/color, placards/labels, UN/NA/PIN number, or on-scene personnel. Do not attempt to recover manifest or bill of lading unless wearing proper protective equipment.
- 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. Equipment must be appropriate and compatible with the chemical(s) involved. Selection should be made by a knowledgeable person using appropriate reference materials. Do not enter hazardous environments, even to effect rescue or carry out decontamination procedures, without proper protective equipment. Responders should never attempt to wear protective equipment without proper training and fit testing as required.
- If protective equipment is not available or responders are not trained in proper use, limit response activities to scene isolation.
- Consult the US DOT Emergency Response Guidebook or CANUTEC Initial Emergency Response Guide, CHEMTREC at 1-800-424-9300 and your local Poison Center for more complete information.
- Under new transport regulations, all hazardous material shipping papers must include an emergency response telephone number.
- Divide the incident into response zones (hot, warm, cold) to ensure responder and citizen safety.

HOT ZONE

- Definition: Area of contamination.
- Entrance requires:
  - Proper training.
  - Appropriate protective equipment.
  - Buddy system
EMS involvement depends on your area needs, standard operating procedures, training (preplanning concerns), and specific incident considerations.

- Care of trapped patients may require EMS involvement.
- Triage activities may be required in mass casualty incidents.
- Patient care activities:
  - Rapid patient removal with attention to possible spine injuries.
  - If patient is trapped or pinned, medical/trauma stabilization care may be required (medical procedures must be carried out by qualified personnel).
  - Airway control.
  - Isolate spontaneously breathing patient’s airway with an escape mask or self-contained breathing apparatus (SCBA).
  - Ventilatory support with demand valve or bag-valve-mask with reservoir and oxygen as needed.
  - Spine immobilization.
  - Rapid removal when extrication procedures complete.

- Any activity, including rescue, requires proper preplanning, training, and protective equipment.

WARM ZONE
- Definition: Area surrounding hot zone.
- Safety buffer area.
- Decontamination area.
- Access and egress to and from hot zone.
- Entrance requires:
  - Proper training.
  - Proper personal protective equipment (PPE).
  - Buddy system.

EMS involvement depends on your area needs, standard operating procedures, training (preplanning concerns), and specific incident considerations. As a preplanning concern, identify personnel (either hazmat team/fire with medical training or EMS responder with PPE training) to be available to perform the following:

- Patient decontamination and medical care during the decontamination process.
- Supervising ambulatory patient self-decontamination.
- Triage activities as patients are removed from the hot zone.
- Immediate care of injured team members during the decontamination process.

Patient care activities:
- Medical care during decontamination.
  - ABCDE
  - Airway
  - Breathing
  - Circulation (hemorrhage control)/C-spine stabilization
  - Decontamination
  - Evaluate for systemic toxicity
  - Spine immobilization.
  - Oxygen administration.
  - Limited invasive procedures.
  - CPR as necessary.

- Any activity in this area will require proper preplanning, training, and protective equipment.
COLD ZONE
- Definition: Safe area, isolated from contamination.
- Command post location parameters:
  - Upwind
  - Uphill
  - Upstream if necessary
  - Easy and safe access
- Staging area for vehicles and equipment.
- EMS involvement depends on your area needs, standard operating procedures, training (preplanning concerns), and incident specific considerations.
- Advise incident commander or planning sector officer/coordinator on potential toxicological, physical and/or environmental health concerns.
- Establishment of triage and patient care areas.
- Triage of "clean patients".
- Patient destination planning.
- Care and transportation of "clean patients".
- Patient care activities:
  - Ensure adequate decontamination has been performed.
  - Transfer patient from decontamination personnel to medical care givers to limit contamination spread.
  - Patient should be on clean backboard or scoop stretcher.
  - Basic and advanced life support functions as required.
- Basic life support:
  - Secure and monitor airway.
  - Ensure adequate C-spine precautions.
  - Administer oxygen.
  - Evaluate pulmonary status and treat respiratory conditions.
  - Evaluate hemodynamic state and treat shock.
  - Treat soft tissue injuries and fractures.
  - Continue decontamination and eye irrigation as necessary.
  - Other treatment as required for specific exposure.
- Advanced life support:
  - Ensure patent airway (advanced airway maneuvers).
  - Evaluate for and treat respiratory conditions.
  - Consider the use of pulse oximetry in the exposed patient.
  - Monitor cardiac rhythm.
  - Treat arrhythmias as necessary.
  - Follow and record any changes in level of consciousness.
  - Establish IV.
  - Shock management.
  - Treat seizures.
  - Specific physiological antagonists (antidotes) as indicated.
  - Treat chemical irritation, burns, and frostbite.
  - Other treatment as required for specific exposure problems.
Any activity in this area requires proper preplanning, training, and minimal protective equipment.

SPECIAL CONSIDERATIONS

All treatment modalities must be carried out under protocol and be approved by local medical control.
Chemical Exposure and Triage

TRIAGE CONSIDERATIONS
- Hazardous material exposure may influence triage decisions in a number of ways. Patient access and emergency treatment may be delayed because of scene conditions and decontamination time. Chemicals may modify how the body responds to trauma by amplifying signs and symptoms. Many chemicals may not show immediate symptoms, and possible delayed symptom onset must be considered to make appropriate triage decisions.

EXPOSURE PATTERNS
- Not all exposed victims are contaminated.
- Chemical/s involved (toxic, corrosive, reactive, flammable).
- State of matter (solid, liquid, gas).
- Route(s) of exposure.
- Initial symptoms.
- Present symptoms.
- Expected symptoms.
- Associated trauma.
- Potential complications from preexisting medical conditions.
- Risk of secondary contamination.

FACTORS CAUSING DELAY IN PATIENT ACCESS
- Scene contamination.
- Extensive isolation areas required.
- Lack of protective equipment.
- Multiple patients.
- Time requirements for decontamination.

EXPOSURE EFFECTS ON HUMAN PROTECTIVE RESPONSES
- CNS depression.
- Cardiovascular system (rate changes, myocardial irritability).
- Respiratory system (depression, paralysis, pulmonary edema).

CHEMICAL ASPHYXIATION AND SHOCK
- Effect on available hemoglobin (hemolysis, carboxyhemoglobinemia, methemoglobinemia)
- Depression of cardiac contractility.
- Arrhythmias.
- Effect on vasomotor center.
- Direct effect on blood vessels (increased permeability, vasoconstriction, vasodilatation).

EXAMPLES OF CHEMICALS WITH IMMEDIATE SYMPTOM ONSET
- Highly soluble corrosive vapors/gases (chlorine, ammonia)
- Corrosive liquids (hydrochloric acid, sulfuric acid)
- Simple asphyxiants (methane, nitrogen)
- Chemical asphyxiants (hydrogen sulfide, cyanide)
- Organophosphates (diazinon, malathion, parathion)
- Methemoglobin formers (nitrates, nitrites)
EXAMPLES OF CHEMICALS WITH DELAYED SYMPTOM ONSET

- Low-solubility corrosive vapors/gases (nitric acid, phosgene)
- Hydrocarbon solvents
- Hydrofluoric acid

EXAMPLES OF CHEMICALS WITH LONG-TERM SEQUELAE

- Carcinogens
- Reproductive toxicants (mutagens, teratogens)
- Asbestos
- Allergens/Sensitizers (phthalates, glutaraldehyde)
- Heavy metals (lead, mercury, arsenic)

COMPLICATIONS

- Many chemicals may cause both immediate and delayed symptoms, depending on level of exposure and individual reactions:
  - Organophosphates and methemoglobin formers may have immediate or delayed onset.
  - Corrosive vapors may have immediate or delayed, depending on water solubility. Toxic decomposition and metabolic products. The initial chemical encountered may not be the actual poison. Many chemicals produce thermal decomposition products more poisonous than the parent compound. Alternatively some compounds undergo a metabolic process of lethal synthesis (e.g., methylene chloride is partially metabolized to carbon monoxide).
- The chemicals listed above represent only limited examples. Each exposure must be evaluated for its individual toxicity and symptom pattern.

SPECIAL PATIENT POPULATION CONCERNS

- Preexisting medical conditions associated with exposures that cause respiratory, cardiovascular, and/or neurological compromise
  - Pregnant: Simple and chemical asphyxiants (especially carbon monoxide) may cause prolonged fetal hypoxia. Chemicals that depress cardiac function may also increase fetal hypoxia. Teratogenic agents may damage the developing fetus.
  - Pediatric: Lower exposure dose usually needed to cause toxic response.
  - Geriatric: Preexisting medical conditions, decreased pulmonary/cardiovascular reserve, and decreased immune system function limit physiological reserve. This patient population may be symptomatic at lower exposure levels than young, healthy adults.
Hazardous Materials
Response Team
Medical Support

PURPOSE
- To ensure safety of the response team during emergency hazardous materials response and remediation operations.
- To prevent heat- or cold-related injuries.
- To limit chemical exposure health effects on team members.
- To provide toxicological information to the incident commander.

IMPLEMENTATION
- Incidents involving potential chemical exposure.
- Large incidents
- Prolonged-duration incidents
- Climatic or environmental conditions with high or low temperature extremes.

PREENTRY EVALUATION
- Baseline vital signs:
  - Pulse
  - Blood pressure
  - Respiratory rate
  - Temperature
  - Body weight (if long duration event is expected)
- Physical evaluation:
  - Breath sounds
  - Dermatitis, sunburn, or areas of skin damage
  - ECG rhythm strip if indicated
  - Mental status evaluation
- History:
  - Medical history.
  - Recent history of illness, fever, vomiting or diarrhea.
  - Recent chemical exposures.
  - Recent alcohol consumption.
  - Prescription and over the counter medications
- Deny entry if:
  - Pulse irregular (without prior history or previous medical clearance).
  - Pulse greater than 110.
  - Temperature greater than 37.8° C/100° F (oral) or 38° C/100.4° F (core).
  - Blood pressure greater than 150 systolic or 100 diastolic.
  - Respiratory rate greater than 24/min.
  - Abnormal lung sounds (wheezing, rales, or rhonchi).
  - Recent onset of medical problems.
Recent history of vomiting, diarrhea or dehydration.
Heavy alcohol consumption in last 24 hours or any alcohol consumption in last 6 hours.
Skin lesions, dermatitis or large sunburned areas.
New prescription medications (not cleared by medical advisor) or over the counter medication use.

- Clear any questionable physical findings or medication questions with medical control.
- Hydration:
  - Each responder should drink 16 oz of water, or electrolyte solution diluted 3:1 immediately before entry.
  - Fluids should be cooled to 4.4° C (40° F).
  - Avoid alcohol, caffeinated or carbonated beverages.
- Pre-entrance briefing:
  - Review signs and symptoms of heat stress.
  - Ascertain identity of chemical/s and evaluate with appropriate resources.
  - Inform all response team members of possible signs and symptoms of chemical exposure.
- Contingency planning:
  - Arrange for medical transportation.
- Notify hospital to assure adequate preparation to receive injured.
- Ensure patient decontamination is set up and appropriate medical equipment is available.

**POSTEXIT EVALUATION**

- Responders should be evaluated (post-decontamination) for signs of heat stress and/or chemical exposure.
- Information obtained during evaluation should be recorded on standard forms.
- If signs of chemical exposure are present, the responder should be treated per appropriate protocol and transported for further care and/or medical follow-up.
- If the age-adjusted heart rate (220-age × 0.7) is exceeded or the heart rate does not return to within 10% of baseline by the end of a rest period, heat stress is indicated. The responder should not be allowed to return to service until the heart rate is reduced below 110 beats per minute. The next work period should be shortened by one third. Fluid loss must be replaced.
- If the oral temperature rises 0.8° C/1.5° F above baseline, the next work period should be decreased by one third. Fluids should be replaced. Responders should not be allowed to work in impermeable clothing if their oral temperature exceeds 37.8° C/100° F.
- If body water loss (BWL) exceeds 1.5% of total body weight, the responder should increase his or her oral fluid intake.

**FLUID REPLACEMENT**

- Fluid replacement plays a vital part in preventing heat stress.
- Thirst is not an effective indicator of heat stress.
- Aggressive fluid replenishment is necessary. During hot weather response activities, the responder should consume at least 1 liter of water per hour.
- Fluid replacement is also needed in cold weather. Heat stress and fluid loss still occur when protective equipment is worn.
Cool water (4.4°C/40°F) is recommended. Carbonated, caffeinated, or alcoholic drinks should be avoided. Fruit juices and electrolyte drinks should be diluted with water (3 parts water:1 part electrolyte drink).

Fluid replenishment starts during suit-up, before first entry.

COOLING DEVICES

- May add bulk/weight and contribute to heat stress.
- Fixed-line cooling units are cumbersome for emergency response operations.
- Generally not recommended for temperatures under 35°C/95°F.

CHEMICAL EXPOSURE CONCERNS

- The medical responder can supply information to the Incident Commander and hazmat team on expected toxicological health effects, including signs and symptoms, onset times, and required treatment.
- The response team should be evaluated for chemical exposure effects and treated/transported as necessary.
- The response team should be debriefed on expected signs and symptoms of exposure.

SUPPORT LOCATION

- Safe location in the "cold zone."
- Protection from prevailing environmental conditions: cool, shaded area in warm weather; a warm, dry area in cold environments.
- Easily reached from the decontamination area.
- Easily accessible by EMS units.
- Large enough for multiple personnel.
- May be a structure or large vehicle (bus, truck) located in the "cold zone."
- Open area may be adequate with appropriate preparations for environmental conditions.

EQUIPMENT

- Fluids for oral replenishment (cool water, electrolyte solutions). Carbonated, caffeinated, or alcoholic beverages should be avoided.
- Food (if long-duration incident—more than 3 hours). Fruit, stew, soup, or broth is digested faster than solid food such as sandwiches. Fats and salty foods should be avoided.
- Medical equipment (oxygen, blood pressure cuffs, thermometers, stethoscopes, cardiac monitors, IV fluids/administration sets, ACLS medications and specific physiological antagonists).
- Salt tablets are contraindicated.
- Tarps and awnings for shade.
- Fans—warm weather; heaters—cold weather.
- Lights.
- Extra clothing.

ADVANCED CONCEPTS: ENVIRONMENTAL TEMPERATURE MONITORING

- The following may be used as general environmental management information for work in all levels of protection. Level A (encapsulated suit and SCBA), level B (protective suit and SCBA), or level C (protective suit and air purifying respirator). Temperature cut-offs are intended for level C environments. Level A and B protection generates more heat build-up and physical stress than that of level C. The use of these higher levels of protection mandates more conservative ambient temperature limits and heat stress medical monitoring procedures.
Heat stress monitoring and prevention should be instituted when the adjusted temperature or the Wet Bulb Globe Temperature (WBGT) reaches 23.9°C/75°F (level C work environments). Some authorities have suggested 21°C/70°F for levels A or B. These measurements take into account the ambient temperature, humidity, and cloud cover (solar load). Both temperatures should be considered, and the higher value used.

**Calculation of Adjusted and Wet Bulb Globe Temperature**

- **Adjusted temperature** = Dry bulb temperature + 13 (% cloud cover factor)
  - Cloud cover factor:
    - No clouds = 1.00
    - 25% clouds = 0.75
    - 50% clouds = 0.50
    - 75% clouds = 0.25
    - 100% clouds = 0.00
- **Wet bulb globe temperature (WBGT)** = 0.7 (wet bulb temperature) + 0.2 (black globe temperature) + 0.1 (dry bulb temperature)

If the WBGT is not available, it can be calculated from the following equation:

\[
WBGT = (0.567T_{db}) + (0.393P_d)
\]

\[
T_{db} = \text{dry bulb temperature}
\]

\[
P_d = \text{water vapor pressure}
\]

Cold procedures (warm area, dry clothing, warm food) should be instituted when the wind chill index is below -12°C/10°F.

The WBGT or wind chill index should be available from local weather stations.

**Responder Heat Stress Monitoring**

- Heart rate is an excellent indicator of body heat stress. Heat stress is indicated when the age adjusted heart rate is exceeded:

  \[
  \text{Age-adjusted heart rate} = (0.7) \times (220 - \text{age})
  \]

- Temperature: A rise in body temperature to 37.2-37.5°C/99 to 99.6°F (oral) is considered the temperature cut-off point for normal workers. If possible, a baseline temperature should be established for each individual response team member. A maximum of 0.8°C/1.5°F rise in temperature is allowed. Body temperature should return to within 0.5% of baseline before the worker is returned to work. Rectal temperature is the most accurate in determining actual body core temperature, but it is not practical for field use. Thermometers measuring the temperature of the blood in the tympanic membrane give a reliable indication of core temperature and a more accurate temperature than oral measurements. These thermometers are available at reasonable prices and offer increased speed and accuracy in field temperature monitoring.

- Body weight: Fluid loss when wearing impermeable protective clothing may be as high as 3.5 L/hr. If these fluids are not replaced, a drop in body weight will be seen. Total body water loss (BWt) should not be allowed to exceed 1.5% of total body weight. Ideally, the hazmat responder should be weighed before and after heat exposure. A scale that is accurate to ±0.25 pounds should be available. This may not be practical in emergency response situations. This procedure is usually conducted in remediation work.
ACCLIMATION

- Acclimation to hot environments and to the use of protective equipment in those environments helps prevent heat stress. Acclimation takes time and is an important factor in remediation work. It is not feasible for emergency operations.

- Acclimation periods may be feasible for long-duration events. The following schedule demonstrates acclimation time (14 days) required for adjustment to full-day work in extreme heat:

  **TIME TO ACCLIMATE WORK AND ENVIRONMENTAL DESCRIPTION**

  Day 1 to 3: Light work during the morning or late afternoon, not to exceed 2 hours
  Day 4 to 6: Light work during the morning or late afternoon, not to exceed 3 hours
  Day 6 to 8: Light work during the morning or late afternoon, not to exceed 4 hours
  Day 8 to 10: Moderate work during the morning and afternoon, approximately 4 hours.
  Day 10 to 12: Moderate work during the middle of the day, approximately 5 hours.
  Day 12 to 14: Moderate work during the middle of the day, approximately 6 hours.
  After day 14: Full days of moderate work.
  Shorter acclimation schedules (4 to 7 days) are also available for less extreme environments.

SPECIAL CONSIDERATIONS

- Individual baseline temperature should be established over a 2-week period with averaging of daily temperature measurements. Obviously, this is a preplanning procedure.

- Many of the above procedures are designed for hazardous material remediation operations. These may be adapted for emergency response needs. Consult with your medical advisor.
Patient Transportation

INITIAL EMERGENCY DEPARTMENT CONTACT

- Early contact essential
- Be sure to communicate the following information:
  - Number of patients
  - Nature of accident
  - Substance(s) involved
  - Route of exposure
  - Duration of exposure
  - Associated trauma
  - Victim examination findings and vital signs
  - Initial signs and symptoms
  - Treatment administered
  - Signs and symptoms now
  - Decontamination carried out?
  - Need for further decontamination?
  - Estimated time of arrival

TRANSPORTATION CONSIDERATIONS

- Exposure potential exists if contaminated patients are transported.
- New ambulance units meeting KKK-A-1822 C 3.13.6 standard are required to have a complete air exchange every 2 minutes. Older units have a relatively poor air exchange rate, with resulting increased risk of secondary exposure to EMS personnel.
- Windows are bi-directional, allowing contamination to come back into the ambulance. Opening of rear windows may allow exhaust fumes (carbon monoxide) into the ambulance.
- Lining ambulance patient compartment in plastic may increase secondary inhalation hazard by limiting ventilation.

REDUCING EXPOSURE POTENTIAL

- Decontaminate before transport.
- Reverse isolation procedures such as transportation bags, plastic, blankets, or zip front body bags may reduce EMS responders' exposure risk. CAUTION: If patient has not been adequately decontaminated, these reverse isolation procedures may increase the patient's chemical exposure risk.
- Provide adequate ambulance ventilation (intake and exhaust fans of proper size).
- Provide adequate EMS personnel protective equipment.
- Patients with toxic ingestions may vomit during transport. The vomitus may contain volatile compounds that may present an inhalation hazard. Vomitus should be immediately isolated in a sealed plastic bag.

AIR TRANSPORTATION

- Usually contraindicated unless rapid transport is necessary and patient is COMPLETELY decontaminated or was exposed to a chemical with no risk of secondary contamination. Vomitus may still pose a threat, and measures should be in place for immediate isolation of emesis.
- Helicopter landing area should be a safe distance from hot zone to avoid spreading the contamination.
Patient Transportation

- Flight crews must be advised of scene conditions to ensure a safe approach.
- Many flight services are apprehensive about transporting patients from a hazmat scene. If helicopter transport is necessary in your area, preincident plans should be made with the flight service. Explain decontamination procedures and demonstrate safe scene practices. This may serve to resolve any potential problems.
- Flight services should not be ignored in hazmat response planning. They may be the only reasonable way to transport severely injured patients from rural areas. Helicopters may also be called to an unrecognized hazmat incident and be on scene very quickly. Flight crews should receive adequate training in hazardous materials recognition and response.
- Helicopter transport of hazardous materials victims should be used when needed and when safety concerns allow.
Useful EMS/HAZMAT Equipment

STANDARD PROTECTIVE EQUIPMENT
- Body substance isolation equipment for “cold zone” operations
- Eye protection
- Mask
- Gloves (latex under glove and chemical resistant outer gloves)
- Fluid-resistant gowns
- Fluid-resistant shoe covers
- Rain gear

SPECIALIZED PROTECTIVE EQUIPMENT
- For “warm” or “hot zone” operations
- Self-contained breathing apparatus (SCBA)
- Air-purifying respirators (APRs)
- Chemical-resistant gloves (with latex under glove)
- Chemical-resistant suits
- Boots or shoe covers

*Use of this equipment requires extensive training beyond the scope of this text. Responders should not attempt to use protective equipment without proper preplanning, training, medical examinations, and fit testing as required. Selection of equipment by an informed/knowledgable individual using appropriate reference sources is essential.*
- Having equipment is not enough. The equipment must be compatible with the chemical. Chemical protective equipment usually does not provide protection against fire or heat.
- Repeated training and practice with the equipment is essential for safe and effective use.

USEFUL, QUICK INFORMATION RESOURCES
- Department of Transportation (DOT) Emergency Response Guidebook (ERG)
- Material Safety Data Sheets (MSDS)
- National Institute of Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards
- United States Coast Guard CHRIS manual
- Chemical Manufacturers Association (CMA) CHEMTREC (1-800-424-9300) and MEDTREC programs
- Emergency information number listed on the shipping papers
- Regional Poison Center
- Numerous other texts, periodicals, and computer programs are available

MISCELLANEOUS SUPPORT EQUIPMENT
- Binoculars
- Plastic bags and basins
- Oxygen supplies for prolonged or multiple patient care situations
- Patient transportation isolation system (e.g., transport bags, zip front body bags)
- Disposable blankets and patient gowns
- Disposable equipment (e.g., suction system, laryngoscopes, stethoscopes, blood pressure cuffs)
Useful EMS/HAZMAT Equipment

- Irrigation fluid and IV tubing
- Morgan Therapeutic Eye Irrigation Lens

**MINIMUM SUGGESTED EQUIPMENT FOR EMS RESPONSE UNITS**
- Binoculars
- Body substance isolation equipment
- DOT Emergency Response Guidebook
- Patient transport isolation system (e.g., transport bags, zip front body bags)

**SUGGESTED SPECIFIC PHYSIOLOGICAL ANTAGONISTS (ANTIDOTES) FOR FIELD USE**
- Activated Charcoal
- Atropine (multidose vials)
- Calcium Gluconate
- Calcium Gluconate Gel
- Cyanide antidote kit
- Flumazenil
- Methylene blue
- Naloxone
- Pralidoxime Chloride
- Use of these agents requires specific approval from local medical control.
- See guidelines for specific applications.

**DECONTAMINATION EQUIPMENT**
- Decon pools or premanufactured decontamination stretchers
- Saw horses
- Backboards
- Soft brushes/sponges
- Pump sprayers
- Variable-spray nozzle and hose
- Mild soap (Tincture of Green Soap or mild liquid soap)
- Towels
- Barrier tape
- Buckets
- Items on fire apparatus (hose lines, salvage covers, ladders)
Postincident Concerns

HANDLING CONTAMINATED MATERIALS
- All articles that are possibly contaminated must be isolated for further decontamination, testing, and/or proper disposal according to federal, state, and local regulations.
- These items may include:
  - Patient clothes and personal possessions.
  - Any contaminated patient care equipment.
  - Responders' contaminated uniforms or protective equipment.

AMBULANCE CONCERNS
- Isolate unit until decontaminated.
- Decontamination of patient compartment.
- Residual contamination.
- Mechanical and outside decontamination.
- CHEMTREC and local Health Department can assist with decision making.

MEDICAL RESPONDER CONCERNS
- Isolation of any possible contaminated clothing and personal possessions.
- All scene responders should shower and change clothes as soon as possible after incident response is terminated.
- Medical follow-up for EMS personnel as needed.
- Completion of all patient records.
- Completion of EMS personnel exposure record.

CRITIQUE OF INCIDENT
- All responders should participate.
- Key questions to ask:
  - What caused incident?
  - Was proper notification made?
  - Were adequate personnel available?
  - Was adequate equipment available?
  - Were communication systems adequate?
  - Were communications adequate and appropriate?
  - What areas need improvement?

CRITICAL INCIDENT STRESS MANAGEMENT
- Factors that cause EMS response team stress:
  - Inability to intervene at scene because of inadequate equipment or training.
  - Multiple victims/triage decisions.
  - Concern for response team member safety.
  - Concern about possible exposure and delayed effects.
- Obtain professional Critical Incident Stress Debriefing Team intervention as needed.
Hazardous Material Team
Member Medical Monitoring Program

MEDICAL SURVEILLANCE
• Required for every hazardous materials response team member.
• Requires specialized physician awareness of hazmat team operations and hazardous material toxicology.
• Identify physician to whom team members report.
• Identify physician to monitor all charts, preferably a medical toxicologist.
• Records must be kept for 30 years after termination of employment.

BASELINE (ENTRY) PHYSICAL EXAMINATION
• Medical history
• Occupational history
• Exposure history
• Hobbies
• Physical examination
• Laboratory testing as required
• Examination and laboratory results reviewed by designated physician
• Letter reporting findings to team member
• Summary letter to employer
• Fitness form
  – Indicate fitness to wear respirator.
  – List any specific work restrictions.

ANNUAL EXAMINATION
• Medical history update
• Occupational history update
• Interval exposure history
• Physical examination
• Laboratory studies
• Additional laboratory testing as required
• Examination and laboratory results reviewed by designated physician
• Letter reporting findings to team member
• Summary letter to employer
• Fitness form
  – Indicate fitness to wear respirator.
  – List any specific work restrictions.

EXPOSURE-SPECIFIC EXAMINATION
• For exposed or possibly exposed individuals
• Detailed history of exposure event
• Symptoms then
• Medical treatment
• Current symptoms
· Current treatment
· Physical examination
· Laboratory studies as indicated
· Examination and laboratory results reviewed by designated physician
· Letter stating findings to team member:
  Address possible need for future medical monitoring.
  Implications for team member
· Summary letter to employer
· Fitness form
  Indicate fitness to wear respirator.
  List any specific work restrictions.

EXIT EXAMINATION
· Interval medical history
· Interval occupational history
· Repeat baseline physical examination
· Repeat baseline laboratory studies
· Keep all records for at least 30 years after employment termination
· Examination and laboratory results reviewed by designated physician
· Letter reporting exit findings to team member
· Summary letter to employer

LABORATORY STUDIES
· Complete blood count
· Biochem profile, including:
  Serum electrolytes
  Bun
  Glucose
  Cholesterol, triglycerides
  Liver function
  Renal function
  Thyroid functions
· Additional biochemical studies as required
· Urinalysis
· Poison-specific tests
  Lead
  FEP/ZPP
  Mercury
  Arsenic
  Cadmium
  RBC cholinesterase
  Plasma cholinesterase
  Specific chemical screening based on area dangers
  NOTE: Paucity of poison-specific laboratory studies
· Urine drugs of abuse screening

DIAGNOSTIC STUDIES
· ECG
· Chest radiograph
· Audiogram
· Pulmonary function studies
· Exercise treadmill examination
· Additional studies as required by examining physician/toxicologist.
Hazardous Material Team Member Medical Monitoring Program

EXPOSURE DIARY
- Hazardous material team member should be encouraged to keep an exposure diary.
- Record all exposures.
  - Symptoms: immediate and delayed
  - Treatment
  - Outcome