

3.4.1.1 Hazmat General Information



YOUR ORGANIZATION
STANDARD OPERATING PROCEDURES/GUIDELINES

TITLE: Hazmat General Information

SECTION/TOPIC: Hazardous Materials General Information

NUMBER: 3.4.1.1

ISSUE DATE:

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PREPARED BY:

APPROVED BY:

X

Preparer

X

Approver

These SOPs/SOGs are based on FEMA guidelines FA-197

1.0 POLICY REFERENCE

CFR

NFPA

NIMS

2.0 PURPOSE

This standard operating procedure/guideline addresses standard operating procedures for hazardous materials response are not just for hazardous materials response teams. Fire and EMS departments that respond, or are subject to respond, to any type of incident involving hazardous materials must develop written SOPs. This is a mandatory federal requirement under the Superfund Amendments and Reauthorization Act (SARA) passed in 1986.

3.0 SCOPE

This SOP/SOG pertains to all personnel in this organization.

4.0 DEFINITIONS

These definitions are pertinent to this SOP/SOG.

5.0 PROCEDURES/GUIDELINES & INFORMATION

5.1 Hazmat General Information:

Standard operating procedures for hazardous materials response are not just for hazardous materials response teams. Fire and EMS departments that respond, or are subject to respond, to any type of incident involving hazardous materials must develop written SOPs. This is a mandatory federal requirement under the Superfund Amendments and Reauthorization Act (SARA) passed in 1986.

Both the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) promulgate regulations under SARA Title I, Section 126. OSHA 29 CFR § 1910.120, Hazardous Waste Operations and Emergency Response (commonly known as HAZWOPER) and EPA 40 CFR § 311 are essentially identical regulations applicable to all emergency responders within the United States regardless of their location or status (i.e., as a paid or volunteer employee). These regulations define five training levels for emergency responders based on the functions they may be expected to perform at a hazardous materials incident:

First Responder Awareness: Individuals likely to witness or discover the release of a hazardous material. Trained to initiate the appropriate response and take no further action.

First Responder Operations: Respond to releases or potential releases of hazardous substances as part of the initial response. Expected to take defensive actions without trying to stop the release, for the purpose of protecting persons, property, and the environment. (This is generally considered the minimum acceptable level of training for members of fire and EMS departments.)

Hazardous Materials Technician: Respond to a hazardous materials incident for the purpose of stopping the release. These individuals are often members of a Hazmat team.

Hazardous Materials Specialist: Respond with and support hazardous materials technicians. Possess specialized knowledge of chemical hazards or container characteristics.

On-Scene Incident Commander: Assume control of the incident beyond the first responder awareness level. This individual must possess minimum training at the first responder operations level with additional knowledge of state, local, and federal response plans.

5.2 Hazardous Materials General Procedures:

- I. **Upon arrival at the scene, the HMRT Officer (or designated member) will assume Hazard Sector and:**
 - A. Perform initial size-up of situation.
 1. Determine if the hazardous material has been identified.

2. Determine immediate risks to health and safety if hazardous materials are involved.
 3. Conduct rapid evaluation for effects of wind, topography, location of incident and receptors, extent of spill or release, fire condition or potential, in order to identify the nature of the incident and severity of immediate hazards.
 4. Attempt to quickly confirm the identity of materials involved, and to determine their primary hazards.
 5. Assume command of the hazmat sector.
- B. Report on conditions and requirements for additional manpower to the on-scene incident commander (IC).
- C. Establish control zones.
1. If possible, establish a Hot Zone to define area of greatest hazard.
 2. If not already designated, suggest that a Warm Zone be established to designate the area where a potential danger exists.
 3. If not already designated, establish an operational perimeter in order to keep unnecessary people away from scene and HMRT operations.
 4. Barrier tape, traffic cones, traffic barricades, sawhorses, fire hoses, or other impediments to vehicle and foot traffic can be used to delineate control zones.
- D. Inform the IC of which agencies should be notified; notification of appropriate agencies can be made through Alarm at the request of the IC.
- E. Initiate/continue identification of materials involved and their hazards.
1. It is imperative that Hazard Sector attempt to determine the identity and volume of the hazardous materials involved prior to initiating mitigation activities.
 2. No HMRT member should enter the scene of an incident to make identification unless all other attempts have been exhausted. These include:
 - Placarding and/or labeling.

- Paperwork/shipping papers/MSDS associated with materials being transported or stored.
 - Persons directly related to the incident, i.e., driver, owner, employee, plant manager, etc.
 - References readily available.
3. Action taken prior to determining the hazardous material involved may worsen the situation. Decisions made early in the incident should be updated as more information becomes available.

F. Hazard Sector:

1. Shall be the first arriving hazmat officer or SOS staff.
2. The duties and responsibilities of Hazard Sector (or designated members) are to conduct initial operations.

II. Upon determining the need, Hazard Sector (or designated members) will conduct initial operations.

A. Establish hazard sector command and operations area and inform the IC of its location.

1. Appoint other HMRT officers or members to operational positions as necessary.
2. Utilize a tactical worksheet to track manpower, assignments, and resources.

B. Continue to obtain technical information pertaining to the hazardous materials involved, using sources of information delineated in Section I.E.2 above and:

1. Chemtrec (800-425-9300).
2. Shipper or manufacturer (Chemtrec can provide assistance or act as intermediary).
3. Computer databases (CAMEO).
4. Other sources of information as appropriate.

C. The HMRT will establish air monitoring for radiation, flammability, O₂ deficiency, corrosivity, and toxicity. The following instruments are available to the TFD HMRT.

1. Combustible gas indicators with O₂ and tox sensors to detect flammable vapors and gases in the percent LEL range and to detect oxygen deficiency conditions, carbon monoxide, and hydrogen sulfide.
2. Combustible gas indicator with ppm capability to detect flammable vapors and gases in the ppm range.
3. Radiation meters (alpha/beta/gamma).
4. Matheson Hazardous Gas Leak Detector to detect the presence of low ppm concentrations of hydrogen, silane, and poison A gases such as arsine, phosphine, and diborane.
5. Colorimetric detector tubes to determine the presence and concentration of specific types of air contaminants.
6. PH paper to detect the presence of acids and bases.
7. Kits specific to detect presence of chlorinated hydrocarbons in liquid or soil (Haz Cat).

D. Identify Objectives

1. Objectives must be based upon priorities identified according to the following criteria:
 - a. Life hazard involved (this would include rescue).
 - b. Environmental hazard.
 - c. The type and magnitude of the hazardous materials involved.
2. The objectives should focus on containment and/or control of the materials involved in a manner designed to prevent or minimize unnecessary exposure of on-scene personnel as well as nearby exposures. Protection of uninvolved property and the environment should also be considered.
3. Hazard Sector shall identify all possible objectives to the IC. The IC shall approve the objectives of the HMRT.
4. Objectives must be clearly understood and communicated to all levels of on scene personnel. Close cooperation and coordination is essential. Hazard Sector must verify that all involved HMRT personnel understand and agree with the objectives of any action undertaken.

E. Develop an Action Plan

1. Upon identification of clearly defined objectives, Hazard Sector shall develop an action plan and present it for approval to the IC.
2. The action plan should be centered around the following:
 - a. Protection of life.
 - b. Protection of the environment.
 - c. Containment and control of the material.
3. The action plan must be understood by all personnel involved at the scene. Hazard Sector must verify that all involved HMRT personnel understand and agree with the action plan before it is initiated.

F. Initiate and monitor progress of the action plan.

1. Hazard Sector shall monitor progress of the action plan to ensure that objectives are accomplished.
2. The action plan may be modified according to the requirements of the incident. These requirements may include rescue. The action plan must be sufficiently flexible to allow such modification.
3. Hazard Sector shall keep the IC informed regarding HMRT activities and the progress of the action plan.

III. All HMRT activities must always be undertaken with safety as a primary consideration. It is the duty of the HMRT members to ensure that all activities are conducted according to the basic priorities of personal safety, safety of others and the environment, and property.

A. The following basic guidelines should be observed:

1. Move and keep people away from the incident.
2. Do not walk into, touch, or come in contact with known or suspected hazardous materials.
3. Avoid inhalation of all gases, fumes, vapors, smoke, or mist at an incident, even if the material involved is not considered hazardous.
4. The HMRT will assess the need for a backup team prior to entry.
5. Never make entry into an incident unless the need for decontamination has been assessed and addressed. If personnel decontamination is required, do not make entry until the

decontamination station is set up and operational.

6. Never make entry into an incident unless the need for medical/ambulance backup has been assessed and addressed.
7. If the presence of an ambulance or additional medical personnel is required, do not make entry until such personnel and equipment are available.
8. Do not make entry unless all members know, understand, and agree with the planned activity and their role.
9. Do not eat, drink, chew gum, or engage in any other hand-to-mouth activities in the Hot Zone, Warm Zone, or Decontamination Area.
10. Do not smoke at any time when inside the HMRT operational perimeter; smoking is not permitted inside any Fire Department vehicle.
11. Any HMRT member who observes an unsafe or potentially unsafe act performed by an HMRT member or officer should stop the act and assure that the act is performed in a safe manner.

B. Hazard Sector shall appoint an officer or HMRT member to act as Haz Mat Safety Officer at the scene of an incident. The safety officer will assist Hazard Sector in monitoring the progress of the action plan, and will report to Hazard Sector or his designee.

- 1 The Haz Mat Safety Officer is empowered to stop any action deemed unsafe or potentially unsafe to the health and safety of HMRT members. Hazard Sector will be informed when activities are stopped because of health and safety concerns.
- 2 The Haz Mat Safety Officer should report to the IC or Hazard Sector any unsafe or potentially unsafe actions performed by other members.
- 3 The Haz Mat Safety Officer will assure that protocols and procedures are followed as they pertain to the health, safety, and welfare of HMRT members.
- 4 The Haz Mat Safety Officer will inform Hazard Sector of potential signs and symptoms of overexposure to the hazardous materials involved.
- 5 The Haz Mat Safety Officer shall review activities as they relate to potential exposure, time on air, and other actions that may affect health and safety.

C. Hazard Sector shall appoint an HMRT member as Medical Officer. The Medical Officer need not be a toxicology certified medic but should see that a tox medic is assigned to medical sector.

1. The Medical Officer will see that potential signs and symptoms of overexposure to the hazardous materials involved are identified.
2. The Medical Officer must verify that all involved HMRT personnel understand the potential signs and symptoms of overexposure before HMRT activities are initiated.
3. The Medical Officer will inform Hazard Sector when HMRT members have been cleared for activity.
4. The Medical Officer will inform Hazard Sector if any HMRT member displays signs or symptoms of overexposure. Members who have been exposed to a hazardous material or who are displaying signs or symptoms of overexposure shall receive immediate medical treatment.
5. The Medical Officer is empowered to remove any member from activity due to medical considerations. The Medical Officer will inform Hazard Sector of any decisions to remove HMRT members from activity.
6. The Medical Officer will inform Hazard Sector if additional medical personnel or ambulances are required.
7. The Medical Officer shall assure that all responding ambulance or rescue personnel have been informed of the potential signs and symptoms of overexposure and coordinate HMRT activities with such personnel, if required.
8. The Medical Officer shall assure that all medical monitoring is documented.
9. The Medical Officer may appoint additional HMRT members to assist him/her or utilize ambulance or rescue personnel, as necessary.
10. The Medical Officer will confer with the Decontamination Officer regarding the location of medical monitoring activities for decontaminated HMRT personnel.

D. Hazard Sector shall appoint an HMRT member as Decontamination Officer.

1. The Decontamination Officer shall determine the need for decontamination, and if required, the optimal procedure to utilize for the hazardous materials involved.
2. The Decontamination Officer shall be responsible for setting up and making operational a decontamination station.
3. The Decontamination Officer may appoint additional HMRT personnel to assist him/her. Fire department personnel may also be utilized during initial set up of the station.
4. The Decontamination Officer may request additional resources through Hazard Sector.
5. The Decontamination Officer will review the following:
 - Number of personnel that will require decontamination.

- Type and extent of contamination anticipated.
- Personal protective equipment required for personnel conducting decontamination activities.
- Potential signs and symptoms of personnel overexposure to the hazardous materials involved.
- Disposition of decontamination water, decontaminated equipment and clothing.
- Termination of decontamination activities.

6. The Decontamination Officer shall confer with the Medical Officer regarding medical monitoring of decontaminated personnel.

7. The Decontamination Officer shall ensure that HMRT members know and understand the decontamination station set-up and procedures that will be utilized.

8. The Decontamination Officer shall report to Hazard Sector when the decontamination station is operational.

E. The Equipment Officer shall be a company officer at the haz mat station on each shift (A, B, C). The Equipment Officer shall be responsible for the following:

- 1 Ensure that the apparatus and all equipment is in good working order.
- 2 Keep a record of all equipment used during a hazardous materials incident.
- 3 The Equipment Officer shall ensure that all equipment is properly stowed upon termination of a response. The Equipment Officer shall document any equipment that has been damaged, lost, or requires replacement.
- 4 The Equipment Officer shall report any equipment or apparatus deficiencies.

V. COMMUNICATIONS

A. HMRT Notification

1. HMRT members are notified via Alarm through normal dispatch or direct telephone (99 line).

B. Communications at a hazardous materials incident.

1. The most accurate communication is person-to-person.
2. Radio communications must be clear and concise.
3. Cellular telephone communications may also be utilized, if available.
4. Runners may be utilized if radio communication is not possible or radio frequencies are overcrowded. When runners are utilized, attempt to use written notes to augment verbal messages to ensure the accuracy of information transmitted.
5. Communication at an incident must be two way in nature. It is imperative that HMRT members in charge of safety, medical, decontamination, instrumentation, and references provide up-to-date information. Clear directions and coordination must flow down from the IC and Hazard Sector.
6. If communication of directions and coordination between elements of HMRT is unclear and the lack of communication and control jeopardizes the safety of HMRT members, Hazard Sector or the Haz Mat Safety Officer shall direct that HMRT activities cease until the problem is remedied.
7. All HMRT activities involving mitigation, control, or reconnaissance should be conducted on a designated radio channel. Transmissions will be monitored by the IC, Hazard Sector, Medical Officer, and the Haz Mat Safety Officer.

C. Other Methods of Communication

1. The following hand signals shall be used when radios are not available:
 - a. Hands gripping throat = out of air, can't breath.
 - b. Grip partner's wrist = leave area immediately.
 - c. Hands above head = need assistance.
 - d. Thumbs up = OK, I am all right, I understand.
 - e. Thumbs down = no, negative, not OK.

VI. PERSONAL PROTECTIVE CLOTHING

- A. The basic minimum protective clothing ensemble shall be worn by all HMRT members within the Hot Zone.
- B. The minimum protective clothing ensemble may be altered to accommodate specific HMRT

activities or hazards at the incident. Hazard Sector shall determine the appropriate types of chemical protective clothing to utilize. The type of protective clothing used may be changed to accommodate changes in the action plan or the status of the incident.

1. Tyvek coveralls, oil-resistant boots or boot covers, undergloves, and heavy latex (not surgical gloves) overgloves can be worn at oil spill incidents to avoid contamination when there is no danger of fire.
 - a. Cotton or cotton and leather overgloves must not be worn unless worn over the chemical-resistant glove ensemble defined above. Cotton or cotton and leather overgloves must be discarded after use.
 - b. No member may participate in spill mitigation activities in street clothes, leather shoes, sneakers, or other types of street footwear.
 - c. Firefighting turnout gear cannot be easily decontaminated and should not be worn at oil spill incidents when there is no danger of fire.
2. At incidents where there is an actual or potential threat from fire or explosion, full firefighting turnout gear must be worn within the Hot Zone including:
 - a. Bunker pants, coat, and boots, and
 - b. Firefighting helmet with face shield, and
 - c. Firefighting gloves and hood.
 - d. SCBA with facepiece in place.
3. At incidents where there is an actual or potential threat from chemical exposure, chemically resistant clothing must be worn within the Hot Zone including:
 - a. Flame-resistant coverall, and
 - b. Chemically-resistant coveralls with hood, and
 - c. Chemically-resistant boots or overboots, and
 - d. Chemically-resistant gloves, and
 - e. Latex, cotton, or vinyl inner gloves, and
 - f. Hardhat.
 - g. Thin cotton undergloves may also be worn under inner gloves in hot weather.

- h. Cotton undergloves may be worn under outer gloves in cold weather.
 - i. Gauntlet gloves may be worn over outer gloves to provide additional hand protection.
 - j. Cotton work gloves may be worn over outer gloves to provide additional hand protection or improve dexterity.
- 4. At incidents where there is an actual or potential threat from chemical exposure and fire, chemically-resistant clothing with firefighting turnout gear shall be worn within the Hot Zone including:
 - a. Firefighting bunker pants, jacket, and boots, or
 - b. Chemically-resistant overboots, and
 - c. Chemically-resistant coveralls with hood, and
 - d. Flame-resistant hood and inner gloves, and
 - e. Vinyl or latex inner gloves, and
 - f. Chemically-resistant outer gloves, and
 - g. Firefighting helmet with face shield.
 - h. Firefighting gloves may be added to the ensemble at the discretion of the Safety Officer; firefighting gloves shall be used whenever fire is present, or hot surfaces are anticipated.
- 5. At incidents where the risk of chemical exposure is extreme, a fully encapsulated, vapor-tight protective clothing ensemble shall be worn within the Hot Zone:
 - a. Flame resistant-coveralls, and
 - b. Latex or butyl undergloves, and
 - c. Chemically-resistant, vapor-tight protective outer garment, including chemically resistant outer gloves and boots, and
 - d. Inner head protection, if applicable.
 - e. Thin cotton undergloves may also be worn under inner gloves in hot weather.
 - f. Cotton undergloves may be worn under inner gloves in cold weather.
 - g. Gauntlet gloves or Silver Shield gloves may be worn under outer gloves to provide additional hand protection.

- h. Cotton work gloves may be worn over outer gloves to provide additional hand protection or improve dexterity. Cotton work gloves must be discarded after use.
- 6. At incidents where the risk of chemical exposure is extreme, and there exists a real or potential threat from flashover and/or fire, a fully encapsulated, vapor tight protective clothing ensemble with flashover protection shall be worn within the Hot Zone:
 - a. Flame-resistant coveralls, and
 - b. Flame-resistant hood and inner gloves, and
 - c. Vinyl or latex inner gloves, and
 - d. Chemically-resistant, vapor tight protective outer garment, including chemically-resistant outer gloves and boots, and
 - e. Flashover-resistant protective outer garment, including outer gloves and boot covers, and
 - f. Inner hard hat, if applicable.
- 7. At incidents involving unknown or uncharacterized hazardous materials, where there is evidence of a potential fire or explosion threat (based on previous events or instrument readings), chemically-resistant clothing with firefighting turnout gear shall be worn within the Hot Zone including:
 - a. Firefighting bunker pants, jacket, and boots, or
 - b. Chemically-resistant overboots, and
 - c. Chemically-resistant coveralls with hood, and
 - d. Flame-resistant hood and inner gloves, and
 - e. Vinyl or latex inner gloves, and
 - f. Chemically-resistant outer gloves, and
 - g. Firefighting helmet with face shield.
 - h. Firefighting gloves may be added to the ensemble at the discretion of the Safety Officer; firefighting gloves shall be used whenever fire is present, or hot surfaces are anticipated.
- 8. At incidents involving unknown or uncharacterized hazardous materials, where there is

no evidence of a potential fire or explosion threat (based on instrument readings), chemically-resistant clothing must be worn within the Hot Zone including:

- a. Flame-resistant coverall, and
- b. Chemically-resistant coveralls with hood, and
- c. Chemically-resistant boots or overboots, and
- d. Chemically-resistant gloves, and
- e. Latex or vinyl inner gloves, and
- f. Hardhat.
- g. Thin cotton undergloves may also be worn under inner gloves in hot weather
- h. Cotton undergloves may be worn under outer gloves in cold weather
- i. Gauntlet gloves may be worn over outer gloves to provide additional hand protection.
- j. Cotton work gloves may be worn over outer gloves to provide additional hand protection or improve dexterity.

C. The HMRT has the following types of protective clothing available for use:

1. Reusable coverall with hood.
2. Disposable fully encapsulated splash protection garment (coverall with hood).
3. Fully encapsulated, vapor-tight chemical protective clothing with chemically-resistant boots and gloves.
4. Fully encapsulated, vapor-tight chemical protective ensemble with Aluminized fire resistant flashover cover.
5. Firefighting turnout coats, boots, and helmets.
6. Fire-resistive gloves and hoods.
7. Hardhats with face shields.
8. Chemical-resistant gloves:
 - a. Butyl.
 - b. Silver Shield.
9. Non-chemical-resistant gloves:

- a. Heavy latex (not surgical) gloves.
- b. Latex or vinyl surgical (inner) gloves.
- c. Cotton undergloves.
- d. Cotton work gloves.

10. Latex/neoprene boot covers.

VII. RESPIRATORY PROTECTION

A. The Hazard Sector shall determine the type of respiratory protection required within the Hot Zone and the Warm Zone.

- 1. At incidents where there is an actual or potential threat from fire or explosion, full firefighting turnout gear must be worn within the Hot Zone:
 - a. Positive pressure self-contained breathing apparatus (SCBA) shall be utilized in the Hot Zone.
- 2. At incidents where there is an actual or potential threat from chemical exposure to high concentrations of known hazardous materials, or exposure to unknown or uncharacterized materials:
 - a. Positive pressure SCBA shall be utilized in the Hot Zone.
- 3. At incidents where there is an actual or potential threat from chemical exposure and fire:
 - a. Positive pressure SCBA shall be utilized in the Hot Zone.
- 4. At incidents where a fully encapsulated, vapor-tight protective clothing ensemble is required:
 - a. Positive pressure SCBA shall be utilized.
- 5. At incidents where the oxygen concentration in the work zone is less than 19.5%:
 - a. Positive pressure SCBA shall be utilized.
- 6. At incidents where there is a real or potential threat of low level radioactivity in the form of alpha and beta particles and chemical exposure:
 - a. Positive pressure SCBA shall be utilized in the Hot Zone.

7. At incidents where there is a real or potential threat of low level radioactivity in the form of alpha and beta particles and no threat from chemical exposure:
 - a. Positive pressure SCBA shall be utilized.
8. At incidents where there are low concentrations of known materials that can be quantified using instrumentation:
 - a. Positive pressure SCBA; or
 - b. Air-purifying full-faced respirator (APR) equipped with organic vapor/acid gas cartridges (OV/AG) can be utilized in the Hot Zone.
9. Restrictions on the use of APRs:
 - a. APRs shall be used only by those members who have successfully passed a qualitative fit test within the calendar year.
 - b. APRs shall be utilized only when concentrations of known hazards can be quantified, and the concentration present does not exceed the capacity of the cartridge.
 - c. APRs shall be full-face; half-face APRs shall not be used.
 - d. APRs shall be utilized only if there is an approved cartridge for the chemical hazards present.
 - e. APRs shall not be utilized when:
 - The concentration of oxygen in the work zone is less than 19.5%; or
 - The concentration present exceeds the capacity of the cartridge; or
 - The concentration present exceeds 50 times the PEL or TWA for those materials which have a recognized OSHA or ACGIH exposure limit; or
 - The concentration present exceeds the IDLH for those materials which have an assigned IDLH; or
 - There is no approved cartridge for the hazard present.
 - f. Cartridges shall be promptly discarded and replaced when:
 - The user detects a warning property such as odor, eye or nasal irritation; or
 - The user experiences difficulty breathing or shortness of breath; or
 - The cartridges appear defective or damaged.

g. At termination, all used cartridges shall be discarded.

10. The qualitative fit test is performed annually.

a. Fit test records shall be maintained at Special Operations by the haz mat training officer, or his/her designee.

11. All HMRT members who utilize respiratory protection must be clean-shaven within 24 hours.

12. All HMRT members who utilize respiratory protection or other forms of personal protective equipment shall be examined by a physician and certified as medically competent.

a. The physician shall be given a copy of the pertinent sections of the OSHA rule 29 CFR 1910.120, as well as a copy of Chapter 5 of the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities DHHS Publication No. 85-115.

b. HMRT members deemed medically unfit for duty shall not be permitted entry into the Hot Zone or the Cold Zone.

c. HMRT members deemed medically unfit for duty shall not be permitted to use respiratory protection.

VIII. DECONTAMINATION

A. The objective of decontamination is to remove contaminants from HMRT and/or other affected personnel, their clothing, and equipment; and to prevent the spread of contamination.

B. The decontamination area shall provide a corridor from the perimeter of the Hot Zone and extending through the Warm Zone in the direction of the Cold Zone. This corridor will not extend into the Hot Zone or the Cold Zone.

1. Whenever possible, the decontamination area should be positioned:

- a. In an area accessible to the Hot Zone.
- b. Close to a hydrant or other usable water supply.
- c. Downwind from the command post, Haz Sector, and staging areas.
- d. Upwind from the actual incident.
- e. Away from environmentally sensitive areas.
- f. Using topographical advantages when possible.

2. The final portion of the decontamination area should be adjacent to the medical monitoring and rehabilitation area.

C. Decontamination procedures to be utilized shall be determined by the Decontamination Officer upon consultation with Hazard Sector. Methods that are available include:

- 1 Dry decontamination involving careful removal and bagging of clothing and equipment, followed by disposal and/or other decontamination procedures at a later time.
- 2 Washing and dilution to flush contaminants from clothing and equipment.
- 3 Absorption of gross liquid contamination from surfaces prior to initiating more thorough decontamination procedures.
- 4 Brushing or other dry procedures to remove solid or particulate contamination from surfaces prior to initiating more thorough decontamination procedures.

D. Respiratory protection and protective clothing to be utilized by decontamination personnel shall be determined by the Decontamination Officer upon consultation with Hazard Sector.

E. All involved HMRT personnel shall become familiar with the decontamination area and procedures prior to entry.

- 1 The Decontamination Officer shall inform Hazard Sector when the decontamination station is operational and HMRT members are cleared for entry.
- 2 HMRT members shall report for medical monitoring and rehabilitation after completing decontamination.

F. Emergency decontamination may be performed on HMRT or other affected personnel who may require immediate medical treatment and transport or whose health may be endangered by the contaminants.

- 1 Contaminated persons will remove contaminated clothing and shower or wash down using equipment available. Contaminated clothing, equipment, and personal articles shall be bagged for subsequent disposition.
- 2 Decontaminated persons may don uncoated tyvek coveralls; or
- 3 If immediate medical transport is required, the decontaminated person may be wrapped in a clean sheet and transported.
- 4 The Decontamination Officer shall report to Hazard Sector if emergency decontamination procedures have been implemented as well as the disposition of the affected personnel.

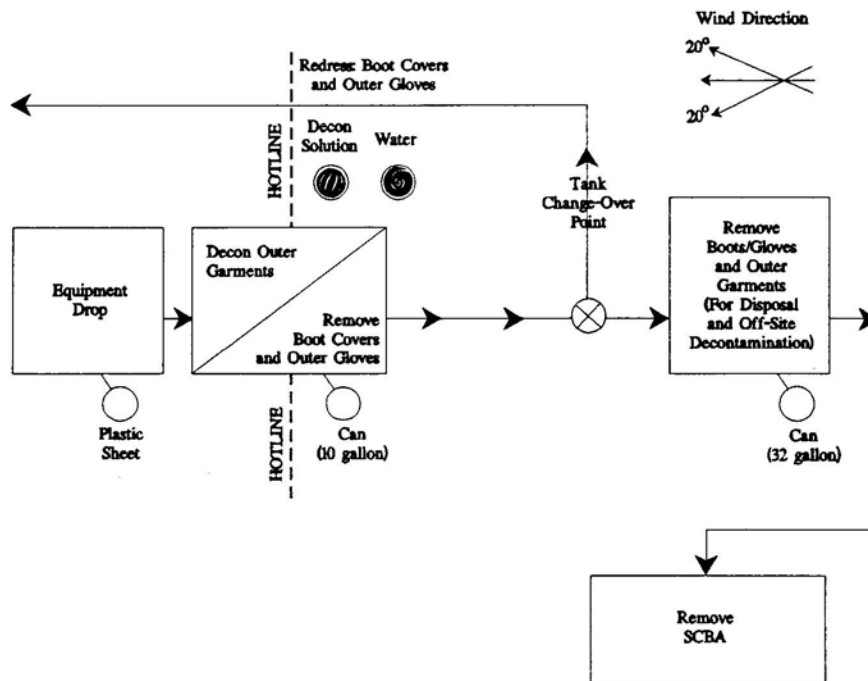
G. Liquid or other by-products of decontamination shall be collected or controlled for subsequent disposal.

- 1 Hazard Sector, in consultation with representatives of other agencies as appropriate, shall determine if such collection or control is required.
- 2 Hazard Sector, in consultation with representatives of other agencies as appropriate, shall determine the final disposition of materials generated or collected during the decontamination process.
- 3 Final disposition of materials generated or collected during the decontamination process shall be the responsibility of the responsible party or ADEQ, or other agencies as appropriate.

H. Decontamination equipment available for use include:

1. Plastic sheeting (4 mil).
2. Tubs.
3. Plastic buckets.
4. Absorbent materials.
5. Applicators and sprayers.
6. Garden and fire hoses.
7. Hydrant adaptor.
8. Scrub brushes.
9. Decontamination agents:
 - a. Liquid detergent (Tide).
 - b. Bleach.
10. Plastic bags.
11. Transfer pumps for liquids.

I. See Figure 1 for minimum layout of a decontamination station. Also see Policy and Procedure Hazardous Materials Contamination Reduction, Volume 2.



Decontamination Station Minimum Layout for Levels A, B, and C

Figure 1

IX. MEDICAL MONITORING AND REHABILITATION

A. The objective of medical monitoring is to rapidly assess the medical fitness of involved HMRT members before and after entry or use of personnel protective equipment; and to determine if involved HMRT members are displaying signs or symptoms of overexposure.

1. Medical monitoring should be conducted prior to, and after, entry or use of personal protective equipment other than turnouts and shall include:
 - a. Heart rate: pulse is taken.
 - b. Blood pressure by auscultation: diastolic and systolic must be recorded, palpation may be necessary, based on high ambient noise.
 - c. Skin temperature/appearance; or

- d. Oral temperature, measured before drinking any liquids.
 2. Personnel shall be considered medically unfit for entry into the Hot Zone if any one of the following is present:
 - a. a. Pulse rate greater than 120.
 - b. b. Irregular pulse rate.
 - c. c. Blood pressure greater than 150/90.
 - d. d. Evidence of extreme exertion, or heat or cold stress based upon skin temperature or appearance.
 - e. Evidence of overexposure to the hazardous material of concern.
 3. HMRT members initially considered unfit for entry into the Hot Zone may be re-examined after a minimum rest interval of 10 minutes.
 - a. If heat stress is suspected, the oral temperature should be determined. Personnel shall be considered medically unfit if the oral temperature is 100.6°F.
 - b. Any HMRT member displaying signs or symptoms of heat stress, cold stress, over exertion, physical injury, or overexposure to a hazardous material, shall receive immediate symptomatic medical treatment and transport to a medical facility, as necessary.
 - c. Symptomatic medical treatment may include:
 - Administration of fluids;
 - Removal from hot or cold environment, as appropriate.
 - Administration of oxygen.
 - Administration of hot or cold packs, as appropriate.
 - Physical injury emergency field treatments such as splinting, bandaging, immobilization.
- B. Transportation for additional medical treatment shall be provided by the local authority having jurisdiction. Such transportation, in the form of an ambulance or rescue vehicle, must be available

for all 2-1 or greater incidents which require the use of respiratory and other forms of personal protective equipment.

1. Responding ambulance or rescue personnel shall be informed of the potential signs and symptoms of overexposure and recommended treatment, as appropriate.
2. HMRT members shall not initiate any activity which involves the use of respiratory and personal protective equipment until:
 - a. Medical transportation is available.
 - b. HMRT members know and understand the potential signs and symptoms of overexposure.

C. The medical monitoring area shall be positioned at the end or adjacent to the end of the decontamination area.

D. The purpose of rehabilitation is to facilitate the rest and recuperation of HMRT members who have used personal protective equipment or otherwise exerted themselves at the scene of an HMRT response.

1. HMRT members who have completed medical monitoring shall occupy the rehabilitation area until rested.
2. Drinking of fluids is encouraged during rehabilitation.
3. Personal protective equipment should be completely removed during rehabilitation.
4. HMRT members are responsible for overseeing their own rehabilitation. After rehabilitation the member shall report to Hazard Sector as available for assignment.

E. The rehabilitation area shall be adjacent to the medical monitoring area.

F. Equipment available for medical monitoring and first aid.

1. Medical monitoring:
 - a. Blood pressure cuff and stethoscope.
 - b. Oral thermometers with disposable shields.
2. First aid:

- a. Oxygen cylinder with disposable masks.
- b. Bag valve mask.
- c. Hot and cold packs.
- d. Assorted wound dressings.
- e. Assorted bandaging material and tape.
- f. Anesthetic disinfectant solutions.
- g. Small water gel dressings.
- h. Small OTC dressings for minor burns.

X. INSTRUMENTATION

A. The purpose of air monitoring instrumentation is to determine the presence and concentration of airborne contaminants that may pose a hazard to human health or to the environment.

- 1 Potential hazards may include toxic, flammable, reactive, oxygen deficiency or excess, and radioactive materials.
- 2 Contaminated atmospheres may pose more than one hazard.

B. Combustible gas/oxygen deficiency meters shall be used during:

- 1 Entry into any confined or semi-confined space.
- 2 Any response involving a spill or release of a flammable material.
- 3 Any response involving report of fire or explosion.
- 4 Any response into a structure containing unknown or uncharacterized hazardous materials.

C. Instruments capable of measuring combustible gas in ppm or units shall be used as indicated above in Section X.B.1 when:

- 1 Combustible gas/O₂ deficiency indicator gives no LEL reading or a reading of less than 4% LEL; and

- 2 The oxygen concentration present in the tested atmosphere is at least 10%.

D. Limitations and use considerations for combustible gas indicators.

- 1 Combustible gas reading are not accurate below an oxygen concentration of 15%; there is insufficient oxygen for any combustible gas reading at oxygen concentrations of 10% or less.
- 2 Inhibitor filters shall be used, if available, to protect the sensor when the presence of leaded gasoline vapors is suspected.
- 3 A charcoal filter may be used, if available, to differentiate between heavy hydrocarbons (such as gasoline or petroleum hydrocarbons) and lighter hydrocarbon gases (such as methane).
- 4 A water trap shall be used, if available, to prevent inadvertent entry of liquids into the instrument.
- 5 Combustible gas indicators shall not be used in corrosive environments. Wetted pH paper or detector tubes should be used to detect the presence of acid or alkaline vapors.

E. Colorimetric Detector Tubes

1. Detector tubes may be useful if a tube is available for a specific known or suspected chemical and the actual approximate concentration can be determined. Such tubes are available, e.g., for ammonia, halogenated hydrocarbons, alcohols, and petroleum hydrocarbons.
2. Detector tubes may be useful to rule out the presence of a known or suspected contaminant.
3. A list of current detector tubes shall be maintained as part of the HMRT inventory.
4. The instructions for each tube shall be read and understood prior to use. The detection range, temperature, humidity, and cross sensitivity limitations should also be understood.
5. Detector tubes respond to a variety of materials in addition to the specific chemical(s) for which it is calibrated. A positive result does not automatically indicate the presence of the chemical for which the tube was calibrated.
6. Detector tubes:

- a. Are sensitive to heat and light and should not be left in the heat or sun for a prolonged period of time.
- b. Shall not be re-used unless the instructions clearly indicate it is appropriate to do so.
- c. Shall be used only with the pump recommended by the manufacturer.
- d. Shall be removed from service when:
 - Damaged, broken, or discolored.
 - The expiration date, which is clearly printed on each box, is reached.

F. The Matheson Hazardous Gas Leak Detector is sensitive to concentrations of less than 1 ppm of specific inorganic gases, which are used in the semiconductor industry. The leak detector shall be used when:

- 1 The response involves a suspected or actual release of specific gases, including:
 - a. Arsine (AsH_3).
 - b. Phosphine (PH_3).
 - c. Silane (SiH_4).
 - d. Diborane (B_2H_4).
 - e. Stibine (SbH_3).
 - f. Germane (GeH_4).
 - g. Hydrogen (H_2).
- 2 The response involves actual or potentially leaking compressed gas cylinders of unknown gases.
- 3 The response involves a facility or location where semiconductor process gases may be used, stored, or transported.
- 4 The leak detector responds to many organic gases, including acetone, benzene, toluene, ethanol, ethylene, and isopropyl alcohol.

G. Radiation detection instruments can detect and differentiate between beta and gamma

radiation. Radiation detectors shall be used when:

1. The response is known to involve radiation.
2. The response involves unknown types of actual or suspected hazardous materials, including but not limited to:
 - a. Abandoned laboratories or facilities containing mixed chemical storage or waste.
 - b. Illegal laboratories or processing facilities.
 - c. Suspicious packages.
 - d. Locations or vehicles suspected to contain radiation.
3. The type of radiation emitted shall be determined, if possible, as well as the relative rate of emission measured in milliroentgens per hour (Mr/hr).
4. Even when the meter gives no increased reading, low level radiation may still be present on the surfaces of objects. Always use gloves when checking for radiation and discard them properly after leaving the suspect area.

H. PH paper shall be used to detect the presence of corrosive gases and vapor and to determine the pH of liquids and solids.

- 1 Water-wetted pH paper may be used in an unknown atmosphere to determine its relative pH.
- 2 Water-wetted pH paper may be used to determine the relative pH of solid materials.

I. Detection kits may be used to detect the presence of chlorinated hydrocarbons in liquid or soil. These kits include:

1. Haz Cat Kit (Chlorine Hot Wire Test).
2. Chlorobenzene Test.
3. These kits may be used when:
 - a. The material or soil contaminated by the material is suspected to contain polychlorinatedbiphenyls or other chlorinated hydrocarbons.
4. Kit instructions must be read and understood prior to use. Latex gloves and safety glasses or a face shield, must be worn. If gloves are contaminated with the suspect material, they shall be promptly changed before continuing.

J. Action levels may be defined as instrument response values which trigger specific actions.

1. The following shall occur when an action level has been reached:

- a. Hazard Sector shall be notified, and
 - b. All involved HMRT members shall be notified, and
 - c. Hazard Sector shall determine if a new action level should be warranted, and/or
 - d. Hazard Sector shall determine if personal protective equipment and safety precautions should be upgraded, and/or
 - e. Hazard Sector shall determine if a portion of the affected area should be placed off-limits, or
 - f. Hazard Sector shall determine if HMRT members should leave the affected area.
2. Action levels other than those defined below may be utilized as appropriate and may be designated by Hazard Sector.
 - a. Deviations from action levels defined below must be documented in writing by the HMRT Officer, and
 - b. Hazard Sector shall ensure that all involved HMRT members know and understand these action levels.
3. % LEL/oxygen deficiency toxic action levels.
 - a. 25% LEL meter reading for unknown gases and vapors in the workzone, based upon a response curve for the unknown containment, or
 - b. 50% actual LEL of a known material in the work zone, based upon a response curve for the known containment, or
 - c. An increase or decrease in oxygen concentration of 1% or more.
4. Radiation detector action level.
 - a. An increase in beta or gamma radiation of 1.0 mR/hr in work zone.
 - b. HMRT members shall attempt to define the area affected, and if possible, shall indicate the source of radiation and the distance from the source where radiation levels decrease to background or below the action level.
5. Matheson Hazardous Gas Leak Detector action level.
 - a. Rapid alarm in any situation where other instrumentation fails to elicit a response.
6. When dealing with known materials, whenever possible, exposure limits and IDLH

values should be determined using:

- a. Colorimetric detector tubes, and
- b. Combustible gas indicators with response curves or factors for the known contaminant.

K. Instrument check out procedures shall be documented in writing, using the Meter Calibration/Span Control Log form.

L. Instruments shall be stored and maintained according to manufacturer's recommendations.

M. Considerations when using instrumentation.

- 1 Use instruments appropriate for the situation.
- 2 The absence of a meter reading does not automatically mean there is no contamination present.
- 3 Never assume only one hazard is present.
- 4 Use one instrument to confirm another.
- 5 Interpret readings in terms of safety and health.
- 6 Do not use any instrument that has insufficient battery power.

XI. TERMINATION

Termination may be defined as the process involved in ending the HMRT emergency response to a hazardous materials incident.

A. Hazard Sector shall determine, upon consultation with the IC, when termination may begin.

1. Hazard Sector shall ensure that all HMRT members are notified that the emergency phase of the incident has ended and that demobilization activities have been initiated.
2. The Decontamination Officer and Medical Officer shall be responsible for demobilization of their respective areas.
3. The Equipment Officer shall ensure that all equipment is properly stowed. The Equipment Officer shall document all equipment that has been used during the incident and any equipment that has been damaged, lost, or requires replacement.
4. Hazard Sector shall finalize all documentation pertaining to entry, actual or suspected exposures, medical monitoring, or any other information that is related to the health

- and safety of HMRT members.
5. The Haz Mat Officer shall finalize all documentation pertaining to HMRT response and operations. The Haz Mat Officer shall collect and examine for completeness all other documentation including:
- a. Personnel sign-in or manning sheets.
 - b. Equipment use logs.
 - c. Medical monitoring logs.
 - d. Information collected from references.
 - e. Instrument check-off lists and response logs.
- B. HMRT members shall return to quarters and assist the Equipment Officer in replacing used equipment or disposables, cleaning of equipment and apparatus, filling used SCBA bottles, and any other activities required to make the haz mat support vehicle fully operational.
- C. Debriefing shall occur when all pertinent documentation is collected and reviewed by the HMRT membership. Errors and omissions shall be identified during debriefing.
- D. A post-incident critique shall be conducted with all members present. The critique shall include an analysis of the response from the point of view of the Haz Mat Officer, Safety Officer, sector officers, and HMRT members. Any recommended changes to policies and procedures or other suggestions shall be documented.
- E. Debriefing and critique activities shall be conducted as soon as possible after the end of an incident at the site or another suitable location.
- F. The Hazardous Materials Command Worksheet, Hazard Sector Worksheet, and Entry Team Checklist shall be used to document activities throughout an HMRT response. The Hazardous Materials Incident Report and Hazardous Material Exposure Report Form shall be completed following an HMRT response. All documentation shall be forwarded to the special operations officer.

XII. HMRT RESPONDER CERTIFICATION

- A. Members shall be certified to OSHA/NFPA response levels.
- 1 First Responder, Operations.
 - 2 Hazardous Materials Technician.
- B. Training for responder certification shall consist of:
- 1 Formal classroom and field evolutions.

- 2 Assigned reading and workbook completion.
- 3 Classroom discussion of workbook answers.

C. Response level competency shall be demonstrated by:

1. Achieving a passing grade (75%) on a written, closed book examination; and
2. Successful demonstration of hands-on competencies as defined in NFPA 472.

XIII. RECORD KEEPING

A. Documents and records pertaining to the following shall be maintained at the appropriate section office of either the City Fire Department or the Second City Fire Department.

- 1 Membership application and approvals.
- 2 Annual physical examination and other medically-related information.
- 3 Attendance at drills and field exercises.
- 4 Training and competency testing.
- 5 Respiratory fit test results.
- 6 Potential exposures at hazardous materials incidents.
- 7 Incident response reports.
- 8 Haz mat units' inventory.
- 9 HMRT Standard Operating Procedures and Practices (Volume II).
- 10 Hazardous Materials Emergency Response Plan.