JACKSON COUNTY LEPC HAZMAT PLAN

STANDARD OPERATING METHODS

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JACKSON COUNTY HAZARDOUS MATERIALS RESPONSE STANDARD OPERATING METHODS

These Standard Operating Methods outline the basic responsibilities and objectives of the Hazardous Materials Response Team. The primary source for this annex is the Standard Operating Methods for the St. Clair Co. Special Emergency Services HAZMAT Team and that of the St. Louis City Fire Department HAZMAT Task Force.

PURPOSE

A variety of hazardous materials, such as toxic and corrosive chemicals, reactive and flammable liquids and gases, are used, manufactured, stored, or transported in Jackson County. Accidents involving their use or transport may occur despite extensive safety precautions taken.

With this in mind, it is the goal of the Jackson Co. LEPC is to offer general guidelines to respond promptly, correctly, effectively, and in accordance with the OSHA HAZWOPER Rule when a hazardous material incident occurs. Response strategies shall be limited to providing for the safety of responders, the public, the environment, and property by controlling and containing an incident. This document does not include remedial or disposal activities.

These methods describe general guides for Hazardous Materials Response Teams. Adjustments in the Command Structure, tactics, strategies, will be necessary to fit the size and complexity of the incident. In some cases, a relatively minor incident may involve a group as few as 4 or 6 responders. Yet the basic principles of incident command, personnel safety, protection of the environment, and regulatory compliance shall still be employed.

PHILOSOPHY

Hazardous materials incident encompass a wide variety of potential situations including fires, spills, transportation accidents, chemical reactions, explosions and similar events. One or more physical hazard (compressed gas, explosive, pyrophoric, flammable or combustible liquid/gas/solid, organic peroxide, oxidizer, or unstable/reactive), health hazard (carcinogen, toxic, agent that damages the lungs/eyes/skin/mucous membranes, irritant, sensitizer, corrosive), or any combination of those hazards may exist at an incident. These methods are generally applicable to postulated hazardous material incidents, but do not address the specific tactics and control measures that should be applied. Use of these methods is only the starting point for each response.

GENERAL POLICY

A. Response decisions and actions are based on the various physical (i.e. liquid, solid, gas, vapor, fume) and chemical (i.e. flammable, corrosive, radioactive, toxic, etc.) properties of the material involved. The exact nature of the material and the setting of the incident will determine specific tactics and control measures.

B. HAZMAT team apparatus shall be kept in the cold zone, and should be backed into an incident as close as possible to the decontamination area.
C. HAZMAT team members shall work within the incident command system.

1. Report to the designated staging area for assignment.
2. Obtain a briefing from assigned supervisor.
3. Review assignments with subordinates, if any, and assign tasks.
4. Obtain equipment or supplies necessary to complete assigned tasks.
5. Execute assigned tasks and monitor progress.
6. Keep supervisor informed of situation, needs, or problems.
7. Resolve any needs or problems reported by any subordinates.
8. Return to the designated staging area when assignment is completed.
9. Receive new assignment or demobilize from the staging area.

D. Take prudent and feasible steps to protect human life, the environment, and property, prioritized in that order.
E. Hazardous material should not be washed down municipal sewers or storm drains, which could compound the problem. In some cases flushing to chemical sewers may be used as a control mechanism. This decision is the responsibility of the Incident Commander (IC) and shall be taken as a last resort where life safety is in jeopardy, or on advice of Illinois EPA.
F. The presence or quantity of the following materials may warrant a "non-attack posture", in which response personnel are engaged only in defensive actions until specialists or experts determine appropriate offensive tactics.

1. Explosives, Divisions 1.1 through 1.3
2. Oxidizers and organic peroxides
3. Poisons
4. Radioactive materials
5. Water reactives

G. Under no circumstances are hazardous materials from an incident to be stored on/in equipment used by the team, or transported from an incident by any team vehicle or member.

SAFETY POLICY

A. Approach the incident from up-wind and up-terrain whenever possible, and with caution at all times.
B. Operations, up to and including evacuation, must be accomplished with the overall safety of response personnel, the public, and the environment as key requirements.
C. Personnel in the hot zone shall employ the buddy system.
D. Exposure to hazardous material shall be kept as low as reasonably achievable.

1. Personnel are required to wear appropriate protective clothing in relation to their task.
2. Stay time within the hot zone shall be minimized.
3. Avoid unnecessary contact or close proximity.
4. Assume that any material is harmful until proven otherwise.

E. PPE shall be visually checked before and after each use for cracks, holes, discoloring, broken fastening devices, and other defects.
F. Response personnel should be constantly alert for symptoms of chemical poisoning, and any actions or reactions that could threaten the lives or health of involved personnel.
G. Hot and warm zone perimeter control shall be maintained at all times.
H. Personnel with assignments in the hot and warm zones shall receive medical evaluation before donning and after removing their PPE.

REFERENCES

A. St. Clair Co. Special Emergency Services.
B. National Interagency Fire Center, Incident Command System.
C. Title 29 of the Code of Federal Regulations, Part 1910.120(q).
D. Title 49 of the Code of Federal Regulations, Parts 172 and 173.
E. FEMA, Fundamentals Course for Radiological Response Teams.
F. REAC/TS, Transport of Radioactive Materials, Q&A about Incident Response.

DEFINITIONS

A. Alpha Radiation - A particle with low penetrating power and short range. It will generally fail to penetrate the skin; paper is an effective barrier. The primary concern is internal exposure by inhalation or ingestion.
B. Beta Radiation - A particle with moderate penetrating power, and a range of up to a few meters. It will penetrate only a fraction of an inch of skin. The primary concern is internal exposure by inhalation or ingestion.
C. BLEVE - Boiling liquid, expanding vapor explosion.
D. Buddy System - The practice assigning a partner to each person entering the hot zone. They shall maintain close proximity and at least verbal contact with each other, and be observant for each other's safety.
E. Cold Zone - The non-contaminated area that surrounds the warm zone, and is restricted to personnel involved in response to a hazardous material incident.
F. Contamination - A deposit of hazardous material at an undesirable location.
G. Criticality Accident - An uncontrolled, uncontained nuclear chain reaction, typically lasting a fraction of a second. Sustained criticality is what occurs in a nuclear power reactor. Just as with the fire triangle, three conditions are required for this to occur; removal of one condition prevents the reaction.

1. Fissile material, typically uranium or plutonium compounds. Check shipping papers and references, and the consult responsible party, to determine if the involved radioactive material is fissile.
2. Moderator, typically consisting of hydrogen compounds such as water, oils, and petroleum products. A moderator slows electron activity to a point that is favorable to chain reactions.
3. Geometry, with a sphere being most favorable to chain reactions. Safe geometry may be achieved by controlling volume (5 gallon pails) and configuration (4-inch slab, 2-foot spacing).

H. Gamma Radiation - An electromagnetic field with great penetrating power and range. It will penetrate the entire body. The primary concern is external exposure by any route.

I. Hazardous Material (from Reference 5d)

1. Class 1 - Explosives

   a) Division 1.1 - mass explosion hazard
   b) Division 1.2 - projection hazard
   c) Division 1.3 - mostly fire hazard
   d) Division 1.4 - no significant blast hazard
   e) Division 1.5 - very insensitive; blasting agents
   f) Division 1.6 - extremely insensitive; detonating agents

2. Class 2 - Compressed gases

   a) Division 2.1 - flammable
   b) Division 2.2 - non-flammable
   c) Division 2.3 - poisonous

3. Class 3 - Flammable liquids
4. Class 4 - Flammable solids

   a) Division 4.1 - flammable solids
   b) Division 4.2 - spontaneously combustible
   c) Division 4.3 - dangerous when wet

5. Class 5 - Oxidizers and organic peroxides

   a) Division 5.1 - oxidizer
   b) Division 5.2 - organic peroxide

6. Class 6 - Poisons and biohazard materials

   a) Division 6.1 - poisonous
   b) Division 6.2 - infectious substance

7. Class 7 - Radioactive materials
8. Class 8 - Corrosives
9. Class 9 - Anesthetic or noxious materials, high temperature materials, hazardous substances, hazardous wastes, and marine pollutants.

J. Hot Zone - The area, which presents maximum hazard. Unprotected exposure is typically at or above permissible limits. This area is restricted to essential personnel wearing appropriate PPE and having an assigned, specific activity. Entry and egress is restricted to the decontamination corridor.

K. Immediately Dangerous to Life or Health (IDLH) - Any atmospheric condition that causes immediate or delayed threat to life, irreversible health effects, or interferes with a person's ability to escape without assistance.

L. PPE - Personal Protective Equipment, consisting of Level A, B, C, or D protective ensembles. See the Personal Protective Equipment section.

M. Responsible Party - Owner of the involved hazardous material. This typically is the facility owner or operator for fixed location incidents, or the shipper for transportation incidents.

N. Site Safety Plan - To the extent possible, it shall include:

1. The site's approximate size, topography, and accessibility.
2. Safety and health hazards expected at the site.
3. Pathways for hazardous material dispersion.
4. Hazardous materials and health hazards involved or expected at the site, and their chemical and physical properties.
5. Required PPE.
6. Secondary escape routes.
7. An emergency evacuation signal.
8. Any hand signals that may be used.

O. Transport Index - The maximum radiation level at one meter from an undamaged package. Survey meter readings with a greater value indicate that the package may have been breached. Note that other radioactive packages in the immediate vicinity may cause inaccurate meter readings.

P. Warm Zone - The contaminant reduction area located between the hot and cold zones. Unprotected exposure at the outer boundary is below permissible exposure limits. No unauthorized or unprotected personnel are allowed into this zone. The required level of PPE is no less than one below that of the hot zone. Entry and egress are restricted to the decontamination corridor.

TEAM AND POSITION ASSIGNMENTS

Apparatus Drivers

A. Know the wind direction while in route to the incident scene, and approach from upwind. Stage equipment
B. Issue supplies from the apparatus as directed to support the HAZMAT Group.

Back-up Team

A. Obtain medical evaluation before donning and after removing PPE.
B. Be prepared at all times to rescue the entry team.
C. Monitor hot zone activities to maintain an awareness of conditions.
D. Remain as inactive as possible so that maximum physical effort may be provided if a rescue situation should occur.
E. Comply with entry team rules while in the hot or warm zones.

Decon Team Leader

A. Determines the most appropriate decontamination location (up-wind and up-terrain from the hot zone) and procedures, and manages the decontamination process.
B. Ensure that Decon team members receive medical evaluation before donning and after removing their PPE.
C. Ensure that the personal property of personnel wearing PPE is safeguarded.
D. Know the signs of contamination and the signs and symptoms of exposure that may be presented by the involved hazardous material.
E. Ensure that containers and bagged materials are properly labeled.
F. Authorize (or deny) the removal of personnel and equipment from the hot and warm zones.
G. Act as liaison with EMS personnel.

Entry Team

A. Obtain medical evaluation before donning and after removing PPE.
B. Carry no personal items into the hot zone for reasons of personal safety and decontamination.
C. Use instruments such as the heat camera, red meter, flammable gas meter, and radiation meters, and supplies such as pH paper, absorbents, adsorbents, and containers.
D. Report the physical layout of the incident site, the hazardous material(s) involved, and a complete picture of current and anticipated conditions.
E. Perform tasks such as spill assessment, control, and containment, victim rescue, etc.
F. Know the signs and symptoms of exposure to the involved hazardous material.
G. Be constantly aware of changing conditions and each other's personal safety.

H. Exit the hot zone through decontamination, or through an emergency exit if necessary.

Entry Team Leader

I. Supervise the activities of entry and back-up teams.
J. Ensure that entry and back-up team members receive medical evaluation before donning and after removing their PPE.
K. Ensure that the entry and back-up teams have the equipment and supplies necessary for their tasks.
L. Check the operation of each team's radio before allowing their entry.
M. Maintain radio contact with entry team(s).

1. Maintain visual contact if radio contact is lost.
2. Order the backup team into the hot zone if radio and visual contact with the entry team is lost, immediately order hot zone operations to be stopped until communication is restored, and inform the Incident Commander of the situation, if appropriate.
3. Ensure that personnel are informed of any new or changed conditions that may affect their activities or safety.

HAZMAT Group Supervisor

A. Identify the hazardous materials involved.
B. Use available information to determine the type and extent of hazard(s).
C. Establish and implement the incident action plan.

1. Assign HAZMAT Safety before allowing entry team operations to begin.
2. Ensure that the decontamination area is established before allowing entry operations to begin.
3. Establish hot and warm zones at an appropriate distance (200 feet minimum) from the incident. Use large windsock to determine downwind area, and boundary tapes and/or physical barriers to define zones.
4. When hazard is known, establish level of protection required for hot and warm zone PPE. When hazard is not known, require the use of Level A in the hot zone, and at least Level B in the warm zone.
5. Consciously avoid commitment to an unacceptably dangerous situation.
6. Establish objectives for controlling and containing the incident.
7. Determine the need to evacuate the public, or to protect them in place.

D. Periodically (~20 minutes) consult with subordinates to review the incident action plan, make changes as necessary, and ensure that any changes are communicated. Ref: St. Louis City FD, 20-Minute Marc system, (personnel accountability).

Liaison Officer

A. A Liaison would be utilized on large multi-jurisdictional incidents.
B. Technical contact/advisor to the responsible party, affected local government, or Unified Command.
C. Useful as an interface with regulatory personnel.
D. Can work out of the Field Command Post.

HAZMAT Research & Reference

A. Technical advisor responsible for finding applicable hazard information. Plant Product Specialists can be utilized in this role.
B. Make recommendations regarding the selection and compatibility of personal protective equipment and decontamination procedures.

HAZMAT Safety

A. Has the responsibility and authority for the safe conduct of hot and warm zone operations. May order the alteration or stoppage of any operation in those areas that presents an unacceptable risk.

1. Ensure that decontamination activities have been established before hot zone entry begins.
2. Review hot and warm zone personnel's on-scene medical evaluations, and deny entry to those having an unsatisfactory evaluation. Direct personnel denied entry to report to the rehabilitation area for observation and re-evaluation.
3. Ensure that the appropriate PPE is being used.
4. Ensure that self-contained breathing apparatus are appropriately pressurized before hot zone entry.
5. Ensure that radio contact is maintained with entry teams.
   a) Maintain visual contact if radio contact is lost.
   b) Order the backup team into the hot zone if radio and visual contact with the entry team is lost, immediately order hot zone operations to be stopped until communication is restored, and inform the Incident Commander of the situation, if appropriate.
      (1) Authority granted to intervene or override is for emergency situations only.
      (2) Advises officer in charge of the function or area to make this communication through the chain of command whenever feasible.
6. Ensure that deployed entry and back-up teams are appropriately decontaminated.
7. Ensure that post-entry medical evaluations are performed after decontamination.
8. Ensure that deployed entry and back-up teams receive timely and appropriate rehabilitation or medical assistance after decontamination.

B. Confer with HAZMAT Group, HAZMAT Site Control, and Entry Team Leader to ensure that appropriate PPE, tactics, and equipment are being employed.

HAZMAT Site Control

A. Develop and supervise the tactical operations of the HAZMAT team.
B. Ensure that the decontamination area is staffed and operational before allowing entry team operations to begin.
C. Brief hot and warm zone personnel to ensure that they have a full understanding of:

    1. Response objectives and tasks, and their expected duration.
    2. Site safety plan.
    3. Present status and capabilities of other site emergency response teams, such as fire and EMS.

D. Ensure that subordinates have the necessary equipment and supplies for their assigned tasks.
E. Periodically (~20 minutes) conduct a roll call to ensure personnel accountability.

HAZMAT Staging Leader

A. Supervise the issuance of equipment from the team's apparatus, and the staging of HAZMAT team members as they report to the incident scene.
B. Ensure that previously deployed team members have been cycled through and released by the rehabilitation area.

DECONTAMINATION

The purpose of the decontamination process is to assure that any potentially harmful or dangerous residues on persons or equipment are confined within the hot and warm zones. The specific measures required to decontaminate personnel or equipment will vary with the contaminant, the circumstances, and the level of contamination. These factors must be considered on a case-by-case basis. Wherever possible take advantage of plant safety showers and corresponding chemical sewer drains for decontamination operations.

A. The decontamination area should be established in the warm zone, upwind of the hot zone, and adjacent to the entrance/exit (lobby control). The decontamination area provides a corridor leading away from the source of contamination toward the exit, with stations along the way for the deposit of tools, equipment, protective clothing, and other items. A person progressing through the area should experience a decreasing level of contamination.
B. When plant safety showers and chemical sewer drains are not available, it will be necessary to construct a decontamination station on a plastic sheet or tarp in a 30 foot by 50 to 60 foot area. Adequate space must be provided to avoid contamination of other areas or persons when showers or spray nozzles are used. It shall be marked by barrier tape, and have easily distinguished entry and exit points.
C. Items must remain within the perimeter of the warm zone until decontaminated or safely packaged for removal. Decon workers shall inspect personnel and/or equipment before they can be released. Inspection may be visual, or it may involve the use of available monitoring instruments or supplies. Nothing may leave the warm zone without approval from the Decon Team Leader.
D. The Decon Team Leader must assume that personnel and equipment leaving the hot zone are contaminated. Three courses of action are available:
E. Not contaminated - confirm using appropriate instruments or supplies.
F. Decontaminate - wash using appropriate methods, confirm using appropriate instruments or supplies, and release.
G. Unable to decontaminate - package (clothing or tools) for removal from the site for disposal or decontamination at a different location.

Decontamination Area Precautions

A. Personnel working in the decontamination area must be adequately protected from contaminants during the decontamination process. These individuals and their equipment will also require decontamination after use.

B. Decontamination solutions normally consist of water and chemical compounds designed to react with and neutralize specific contaminants. The temperature of the liquid and contact time should be given consideration to be sure complete neutralization has taken place.

C. Always use "4H" gloves and safety goggles when mixing solutions. Avoid splashing and over-mixing. Follow directions for mixing carefully/plastic stirrer. When in doubt, ask for assistance from the Decon Team Leader.

D. Decon workers will apply the appropriate solution to the entry team member using the brushes supplied, being careful not to splash the solution or enter the containment pool. Decon workers will also rinse the entry team member.

E. A Decon worker shall assist each entry team member with suit and SCBA removal.

F. Any run-off or residue from decontamination procedures must drain to a chemical sewer, or be contained within the warm zone, and retained for proper disposal.

Contaminated Patients

A. Patients in need of medical treatment should be removed from the source of contamination as quickly as possible, and decontaminated in a safety shower. Safety showers are common place in the industrial environment. Where safety showers are unavailable, it may prove necessary to use a booster line from a fire truck to minimize the severity of the injury or exposure to the patient. Immediately remove contaminated clothing while flushing with copious amounts of water. Depending on the degree of decontamination accomplished, nature and severity of injuries, a more thorough decontamination may, or may not be warranted before transport of the patient by ambulance. In general 15 minutes of thorough flushing in a safety shower is recommended for chemical splashes. Patients should not be allowed to contaminate other persons or ambulances. In some cases it may be necessary to bring treatment personnel (with adequate PPE) into the warm zone to begin prompt treatment of these patients.

B. In some rare circumstance it may become necessary to transport a contaminated patient with life-threatening injuries/illnesses to a medical facility. The ambulance should be brought to the warm zone perimeter for loading. When feasible, the ambulance should be prepared by draping exposed surfaces with sheets or polyethylene covers. The receiving facility must be notified about the nature and extent of the contamination while the ambulance is in route so that necessary preparations can be made. The transporting ambulance will be considered contaminated, and will be decontaminated before being used to transport any non-contaminated persons.

Minimal layout

A. Segregated equipment drop.
B. Safety shower / decontamination station with chemical sewer drain.
C. SCBA tank change and hot zone re-entry, if appropriate.
D. Boot, glove, suit, and SCBA removal area.

Preparing decontamination solutions.

A. Solution A - A solution containing 5% Sodium Carbonate (Na Co) and 5% Trisodium Phosphate (Na Po). Mix four pounds of each with ten gallons of water. These chemicals are available in most hardware stores.

B. Solution B - A solution containing 10% Calcium Hypochlorite Ca (C10). Mix eight pounds of Ca (C10) with ten gallons of water. Calcium Hypochlorite is commonly known as HTH and is available from swimming pool supply stores. Make sure you purchase HTH in plastic containers or transfer it from cardboard drums into clean plastic buckets marked “oxidizer”.

C. Solution C - A solution containing 5% Trisodium Phosphate (Na Po). This solution can also be used as a general-purpose rinse. Mix four pounds of Na Po with ten gallons of water.

D. Solution D - A dilute solution of vinegar (acetic acid). Mix two to three gallons of vinegar with ten gallons of water. Use a wooden or plastic stirrer.
E. Solution E - A concentrated solution of Tide or other detergent and water. Mix into a paste and scrub with a brush. Rinse with water.

Selecting Decontamination Solutions

A. Contact expert assistance from manufacturers, poison control centers, medical specialist, etc., to determine the best solution.
B. Unknown/unidentified materials - A or B
C. Inorganic acids, metal processing waters - A
D. Heavy metals (mercury, lead, cadmium, etc.) - B
E. Pesticides, chlorinated phenols, and dioxins - B
F. Cyanides & other non-acidic inorganics - B
G. Solvents and organic compounds such as Trichloroethylene, Chloroform and Toluene - C or A
H. PBB's and PCB's - C or A
I. Oily, greasy unspecified wastes not suspected to be contaminated with pesticides - C
J. Inorganic bases, ammonia's, alkali and caustic wastes - D
K. Radioactive Materials - E
L. Etiologic Materials - A or B

GENERAL TACTICAL PLAN

The chronology of each response will follow the S.I.N.C.I.A.P.C.P.D.D.D. method.

A. Safety - first, last, and always.
B. Isolate and deny entry to established perimeters.
C. Notification of proper authorities (ESDA, IEMA, National Response Center).
D. Command establishment.
E. Identification of material(s) using at least three sources.
F. Analysis of hazards and situation.
G. PPE level chosen for responders.
H. Containment of hazardous material(s).
I. Protection of the public (shelter in-place or evacuate).
J. Decontamination.
K. Demobilization of responders and equipment.
L. Documentation and dissemination of response actions.

Size Up

HAZMAT Groups shall complete a careful size-up before committing to an incident action plan.

A. The objective of the size-up is to identify the nature and severity of the immediate problem and gather sufficient information to formulate a valid action plan. A hazardous material incident requires a cautious and deliberate size-up. Entering the scene to make positive identification may be a considerable risk. The danger of explosions, leaking gas, and exposure may be great.
B. Avoid premature commitment of companies and personnel to unknown or potentially hazardous locations. Proceed with caution in evaluating risks before formulating a plan. Keep uncommitted companies at a safe distance.
C. Identify the hazardous area based on potential danger, taking into account materials involved, time of day, weather conditions, location of the incident, and degree of risk to unprotected personnel. Take immediate action to evacuate, shelter in place, and/or rescue persons in critical danger if possible while providing for safety of rescuers. Note that action taken prior to determining the product involved may be totally wrong and may severely compound the problem.
D. Identify the type of materials involved, and the hazards they present, before formulating a plan of action. Look for labels, markings, placards, shipping papers, and material safety data sheets. Refer to pre-fire plans, and confer personnel at the scene.

Action Plan

HAZMAT Group will formulate an incident action plan to deal with the situation based on the initial size-up and any other available information.

A. Most hazardous materials are intended to be maintained in a safe condition for handling and use through confinement in a container or protective system. The emergency is usually related to the material escaping from the protective

container or system, and creating a hazard on the exterior. The action plan must identify the method(s) of hazard control, and the available/required resources for its accomplishment. Safety shall be the plan's first consideration. It may be necessary to select one method over another due to the lack of availability of a particular resource, or to adopt a defensive posture while waiting for needed equipment or supplies. Avoid committing personnel and equipment prematurely, or "experimenting" with techniques and tactics.

B. The following may be significant action plan elements at any hazardous material incident. Not all will be significant at any particular incident.

1. Call for additional resources when their need is only anticipated. The actions taken in the first few minutes of an incident affects the outcome more than any other single factor.
2. Use appropriate instruments and supplies to determine the type and extent of hazard.
3. Stop or control the leak.

    a) Close valves.
    b) Replace missing caps.
    c) Tighten loose fittings and bolts.
    d) Plug or patch openings.
    e) Place container in upright position.
    f) Use adsorbents.

        (1) Activated carbon
        (2) Activated alumina

4. Contain the leak.

    a) Pail or drum
    b) Absorbents

        (1) Booms
        (2) Pads/towels
        (3) Vermiculite/sawdust

    c) Dike-dam
    d) Plug-patch
    e) Overpack
    f) Solidification

5. Segregate incompatible materials.
6. Remove uninvolved materials.

    a) Move individual containers or tank cars.
    b) Cool containers before moving.

7. Apply diluting spray or neutralizing agent. Use water on some materials as a last resort only (Activated Chlorine, Phosphorous Pentasulfide).

    a) Dilute water-soluble liquids.
    b) Use spray streams to dilute vapor.
    c) Neutralize corrosives.

8. Check for radioactive material contamination (alpha, beta, and gamma) at the site of an explosion whose cause is unknown, or of a suspicious nature. (Suspect Terrorist activities)
9. When toxic or irritant vapors are being carried downwind, it may be most effective to "protect in place" instead of evacuating the area. In such cases, inform citizens to prevent contact with the material by staying indoors with windows and doors closed and HVAC systems turned off.

C. In all cases, the responsibility for the safety of all potentially endangered responders and the public rests with Command.

Specialist Employees

A. In some cases, it may be advantageous to use these personnel to evaluate hazards and perform certain functions for which they have particular experience or ability.
B. When used, these personnel shall be outfitted with appropriate PPE and made aware of its functions, limitations, and any necessary safety precautions for its use. HAZMAT team personnel with appropriate PPE must closely monitor and/or accompany such personnel to ensure their safety.
C. Transportation emergencies are often more difficult than those at fixed locations. The materials involved may be unknown, warning signs may not be visible or obscured by smoke and debris, and the driver may be killed or missing. Federal Department of Transportation hazardous material marking systems may be inadequate because most hazardous materials in quantities up to 1,000 pounds do not require a placard, and there may combinations of hazardous materials involved with only a "dangerous" placard showing. Sometimes only the most prominent hazard is identified, while additional hazards are not placarded or labeled.
D. Jackson County EMA has a reference list of personnel and organizations which may be helpful during a hazardous material incident, including:
E. Fire Department personnel with particular experience or knowledge.
F. Authorities in charge of landfills and dumps where hazardous materials may be disposed of.
G. Commercial chemical experts with experience in chemical handling and/or disposal.
H. Pesticide consultants and disposal teams with equipment to clean up agricultural chemical spills.

I. Personnel from State and Federal regulatory agencies. These personnel should be contacted for incidents involving hazardous material transportation, and when a reportable quantity of material has been released.
J. Railroad and common carrier information numbers.
K. Tank truck companies with defueling capability (in case the carrier involved in the incident has none).
L. Radioactive material and military weapons emergency contacts.

TACTICAL PLAN FOR FLAMMABLES

A. This supplements the general tactical plan.
B. Ignited gas should not normally be extinguished, since this changes the hazard from visible to invisible and creates an explosion hazard.
C. Fires should be controlled by protecting exposures, and extinguished by stopping the liquid or gas flow.
D. The responsible gas company must be notified and consulted before taking offensive action if high-pressure natural gas lines are involved.
E. Check systematically using combustible gas meters.
F. Do not rely on gas odor. Odorant may be filtered out by passage through the ground.
G. Start close to area of concern and take several readings.

    1. Use ground probe and check in any holes or caverns for pockets of gas.
    2. Inside structures, check around pipes, near cracks in foundations and in high portions of the building.

H. If gas is detected, work to identify the point of origin.
I. Map readings within the affected area.
J. Always be aware of the possibility for ignition and explosion.
K. Minimize the number of personnel in the hot zone, and use natural barriers for their protection.
L. Do not activate any switch within the hot zone.
M. Use non-sparking tools within the hot zone.
N. Shut off possible sources of ignition (pilot lights, electricity, etc.) from outside of the affected area.
O. Ventilate buildings with positive pressure blowers when flammable gas concentrations are found.
P. Cooling containers may reduce the hazard of venting, ignition, and BLEVE (do not attempt with water reactive and some radioactive materials).
Q. Use adequate water supply (two independent sources if possible).
R. Apply heavy streams to vapor space.
S. Use unmanned streams.
T. Use water spray to approach and secure the source of a leak that can not be stopped remotely (do not attempt with water reactive and radioactive materials).

TACTICAL PLAN FOR RADIOACTIVE MATERIALS

A. This supplements the general tactical plan for peacetime radiological emergencies.

B. For practical purposes, the units for exposure, absorbed dose, and dose equivalent are considered equal and interchangeable.

C. Exposure is expressed as Roentgen ® or coulomb per kilogram.

D. Absorbed dose is expressed as rads (rad) or Gray (Gy). 100 rad equals 1 Gy.

E. Dose equivalent is expressed as Roentgen equivalent man (rem) or Sieverts (Sv). 100 rem equals 1 Sv. This translates the absorbed dose into relative biological effect.

F. Activity is expressed as Curies (Ci) or Becquerels (Bq). 1 disintegration per second equals 1 Bq. 1 Ci equals 3.7×10^{10} Bq. This is a count of radiation particles detected per unit of time.

G. Prefixes

1. k = kilo = 1000 = 10^3. Example: 1 kilogram = 10^3 grams (about 2.2 pounds).
2. m = milli = 1/1,000 = 10^{-3}. Example: 1 mR = 1/1,000 Roentgen.
3. μ = micro = 1/1,000,000 = 10^{-6}.
4. n = nano = 1/1,000,000,000 = 10^{-9}.
5. p = pico = 1/1,000,000,000,000 = 10^{-12}.

H. Transporting vehicle limitations.

1. Non-exclusive use vehicles.
2. Must have DOT Class 7 placards and 4-digit ID numbers displayed if carrying 1 or more packages with Radioactive Yellow III label.
3. 200 mR/hour at the vehicle surface.
4. 10 mR/hour at 1 meter from individual packages.

I. Exclusive use vehicles.

1. Must have DOT Class 7 placards and 4-digit ID numbers displayed.
2. 2 mR/hour in the cab.
3. 200 mR/hour at the vehicle surface.
4. 10 mR/hour at 2 meters from the vehicle.
5. Closed individual packages inside the vehicle can be 1 R/hour on their surface.

Labels and their limitations.

A. Radioactive White I

1. Upper half of label has radiation symbol on white background.
2. Lower half of label is preprinted with “RADIOACTIVE I” and DOT class “7”, and has spaces for indicating the contents and its activity.
3. External radiation limit for using this label is 0.5 mR/hour on the package surface.

B. Radioactive Yellow II

1. Upper half of label has radiation symbol on yellow background.
2. Lower half of label is preprinted with “RADIOACTIVE II” and DOT class “7”, has spaces for indicating the contents and its activity, and a block for indicating the transport index.
3. External radiation limits for using this label:

    a) 50 mR/hour on the package surface.
    b) 1 mR/hour at 1 meter from the package surface.

C. Radioactive Yellow III

1. Upper half of label has radiation symbol on yellow background.
2. Lower half of label is preprinted with “RADIOACTIVE III” and DOT class “7”, has spaces for indicating the contents and its activity, and a block for indicating the transport index.
3. External radiation limits for using this label:

    a) 200 mR/hour on the package surface.
    b) 10 mR/hour at 1 meter from the package surface.

4. This label is required for fissile class III or large-quantity shipments, regardless of the radiation level.

Radiation dose.

A. Limits.

1. Lifesaving or protection of large populations - greater than 25 rem only on a voluntary basis.
2. Lifesaving or protection of large populations - 25 rem.
3. Protection of valuable property - 10 rem.
4. All other operations - 5 rem.

B. Example effects of acute, total body radiation exposure.

1. 5 rem (5,000 mrem) - no detectable injury or symptoms.
2. 100 rem (100,000 mrem) - may cause nausea and vomiting for 1-2 days, and temporary drop in the production of new blood cells.
3. 350 rem (350,000 mrem) - nausea and vomiting initially, followed by a period of apparent wellness. At 3-4 weeks, there is a potential for infections and bleeding due to a deficiency of white blood cells and platelets. Medical care is required.
4. Greater exposure levels may be fatal.

Personal protective equipment.

A. The chemical hazards from radioactive materials, or those from other materials involved in an incident, are likely to be the basis for establishing PPE requirements.
B. If the only hazard is radioactivity, hot zone personnel shall use at least Level B PPE until the airborne contaminant concentration is determined.
C. PPE with respiratory protection will prevent internal and external contamination from radioactive particulate, but not necessarily from radiation exposure.

1. Alpha radiation will not penetrate Level A, B, or C PPE.
2. A slight amount of beta radiation may penetrate Level A, B, or C PPE.
3. Gamma radiation will penetrate Level A, B, or C PPE.

Decontamination.

A. Standard decontamination practices will remove radioactive particulate.
B. Virtually any covering, such as water, blood, dirt, etc., will shield alpha radiation from detection. Beta radiation may also be shielded, but not to the same extent as alpha. Ensure that personnel, suits, and equipment are clean and dry before surveying them for release.
C. Used decontamination solutions shall be accumulated in one or both of the following arrangements, unless otherwise directed by a Health Physicist or criticality safety expert, to ensure the maintenance of criticality safety margins.

    1. No more than 4 inches deep across infinite square footage, such as in a decontamination pool or portable water tank.
    2. In 5-gallon buckets, each separated by at least 2 feet in any direction.

Site operations.

A. Consider both direct radiation exposure and contamination. There is no reason to risk exposure of personnel if there is no life hazard, rescue situation, fire, or other hazardous material involved. First arriving units should secure a perimeter and evacuate the area.
B. Establish the hot zone perimeter where survey meter readings are 1 to 2 mR/hour above background.
C. Each hot zone team shall be equipped an appropriate survey instrument, and should be equipped with personal dosimeters. If dosimeters are not available, each team's exposure should be estimated by multiplying the greatest survey instrument reading by the amount of time they spent in the hot zone.
D. In transportation incidents, contamination is present if a survey instrument detects radiation in excess of the applicable vehicle or label limitations.
E. Do not ventilate an enclosed contaminated area unless otherwise directed by the shipping papers, a Health Physicist, or the responsible party.

F. Use minimal amounts of water on a vehicle or container.

1. Adding water to some materials may cause a chemical reaction, such as the generation of hydrofluoric (HF) acid and gas from uranium hexafluoride (UF_6).
2. Failure to promptly extinguish or adequately cool a container may result in a significant chemical and radiological release.
3. In rare circumstances, such as with a breached cylinder of uranium hexafluoride (UF_6), adding water may result in a criticality accident.

PROTECTIVE ACTION DECISION MAKING (Evacuation)

The Jackson County Local Emergency Planning Committee recognize the importance of properly protecting the public during hazardous materials emergencies. There are three options for protective actions: shelter-in-place, evacuation, and breathing & skin protection. A combination of all three of these actions may be appropriate during some incidents to effectively protect the public.

The two primary protective actions are shelter-in-place and evacuation. Breathing and skin protection are used when people are evacuating or sheltering in place.

Shelter-in-place is the use of a structure and its indoor atmosphere to temporarily separate people from a hazardous outdoor atmosphere. To shelter-in-place, people move indoors immediately, close all windows and doors as well as shutting off all heating, cooling and ventilation systems. The level of protection can be enhanced by moving to an interior room (or one with as few windows as possible), placing a towel under the door, and firmly taping sufficiently sized sheets of plastic over any openings such as windows or vents. DO NOT GO INTO THE BASEMENT.

The main advantages of shelter-in-place are:

A. Its relatively quick deployment.

B. It minimizes public exposure.

C. It minimizes additional demands placed on public safety resources.

This can be a particularly important advantage in densely populated areas where a rapid evacuation is impossible.

The disadvantages of shelter-in-place are:

A. A suitable structure is required to be effective.

B. It is not as widely known or as widely understood by the public as evacuation.

C. It may not protect people during long term releases because low concentrations will eventually infiltrate many of the affected structures.

Evacuation is the relocation of people to a safe area to avoid exposure. The main advantages of evacuation are:

A. Widespread public familiarity.

B. The evacuated population avoids any further exposure once they arrive in an area of safe refuge.

C. The evacuated population avoids any potential injuries due to fire and explosions.

D. Public exposures can be avoided entirely if evacuations are completed prior to the hazardous materials reaching the location of the affected population.

The disadvantages of evacuation are:

A. Safe and rapid evacuation routes must be determined and well known to the at-risk population.

B. Some members of the population may refuse to evacuate for a number of reasons.

C. Support services must be provided to the evacuees during the entire evacuation.

D. Evacuation requires greater number of resources and time to implement than shelter-in-place, especially in densely populated areas or in institutionalized populations (hospitals, health care facilities, correctional facilities, schools, etc).

There are many variables that can affect which option will best protect the public. The National Institute of Chemical Studies recommends considering six categories of factors:

A. The hazardous material and its configuration.

B. Characteristics of the population at risk.

C. Time factors.

D. Meteorological conditions.

E. Communications capabilities.

F. Emergency response capabilities.

Several variables exist in each of these which may directly impact the overall effectiveness of Protective Action. Full, complete and absolute analysis during any ongoing hazardous material release is impractical. Today's Incident Commanders are frequently forced to make quick decisions with less than ideal or

fluid data sets. Excessive analysis of any protective action decision poses an even greater threat of exposing the public to harm.

Decision Responsibilities and Resources

Deciding which protective action(s) to take and managing the implementation of that decision are the responsibility of the Incident Commander. The research section will assist the IC by providing the data necessary to make an informed and timely decision. In many cases the company representative should be able to provide valuable information to the IC regarding the nature of the hazardous material. The IC Shall use any and all resources available (Appendix __) to provide assistance and advice.

Initial Decision Recommendations

To assist ICs in making the protective action decision, the LEPC has developed some general guidelines regarding protective actions. There are numerous information variables to consider during the life of any a hazardous materials incident, *the following information is intended as serve as general guidance only.*

Some situations may call for the IC to take different action altogether than that listed here.

The Protective Action Decision Tree also reflects these recommendations in a flow chart format later in this document.

For releases of FLAMMABLE or EXPLOSIVE materials, evacuation is the recommended course of action, PROVIDED there is an available evacuation route that does not go through the flammable or explosive material.

Because it takes very high concentrations of flammable gases to support combustion, the potential impact area from a flammable gas is small relative to a toxic gas release, so evacuations are practical in these situations.

For releases of TOXIC gases or MISTS, SHELTER-IN-PLACE is the recommended option UNLESS SUITABLE STRUCTURES ARE NOT AVAILABLE (i.e. an outdoor park or stadium setting). The potential impact from a toxic gas release can be much larger than that from flammable or explosive materials. Shelter-in-place is a much quicker and effective means of protective action which requires far fewer resources.

Most releases are short term releases, so shelter-in-place will provide adequate protection for MOST-but not ALL-releases of toxic gases or mists. Evacuations are very time consuming and require tremendous

resources, so trying to beat the plume is VERY risky. Large scale evacuations are impractical unless there is adequate time to implement them before the hazardous material reaches the population. Evacuations of nonambulatory populations such as hospitals and nursing homes pose even greater difficulties.

IF THE HAZARD IS UNKNOWN, Shelter-in-place IS THE RECOMMENDED PROTECTIVE ACTION until more information is gathered about the nature of the hazard of the material. Being indoors is much better than being outdoors. People lacking insufficient structures will require evacuation. Shelter-in-place is likely to provide the best protection against toxic gases and mists, and some protection from flammable or explosive materials.

Evaluation stage recommendation

The evaluation stage begins after the IC has made the initial protective action decision. It is the stage where the IC, the research sector, and the Health Department begin gathering more information about the six categories of factors and evaluating the effectiveness of the ongoing protective action.

If an evacuation has been implemented, monitor the progress of its implementation. Monitor the incident and the six factors for any changes that might affect the size of the evacuation area, and modify the area as needed.

If an initial shelter-in-place has been implemented, the key question is this:

Will continuing shelter-in-place provide adequate protection?

Use the following informational tools to answer the above question:

- CAMEO can be used to predict infiltration rates of toxic gases into most structures over time.

- If people have followed the shelter-in-place instructions, toxic mists (ACID MISTS) will not infiltrate the structures at the same rate they would penetrate a ventilated structure.

*The protection provided by shelter-in-place can be enhanced by instructing people to seal themselves in a room using Duct or a strong type of adhesive tape, adequately sized plastic sheeting to cover openings and vents, and by placing wet towels over their nose and mouth areas-the effectiveness of this depends on the nature of the hazardous material involved.

*If continued shelter-in-place efforts will not protect some of the people, then consider if evacuation of those people will expose them to a greater hazard, and if it can be done without injury to emergency responders.

The hazard posed by evacuating these individuals can be somewhat reduced by advising them to use as much breathing and skin protection as possible (i.e. wet towels over their nose and mouth areas, use of waterproof rain gear or long sleeved clothing if possible, etc.) Both the protective measures and the efficacy of these depends a great deal on the nature of the material involved.

Special Case Situations

A. School systems

1. Protective actions involving schools present a special case. School officials remain responsible for students at all times school is in session, including periods of general evacuations and other emergency situations.

2. Most school districts have prepared detailed evacuation plans calling for movement of students using school buses and sheltering them at other schools nearby. However, in extreme circumstances, students will be evacuated by whatever means are available and transported to a single reception center, if possible.

3. Incident Commanders should plan for a potentially large influx of concerned parents and family members into the affected area. Potential exposures, injuries and crowd problems can be mitigated by establishing a reception center staffed by city and county Victim Assistance staff members. Detailed lists of students names and exact whereabouts should be made available to parents immediately.

4. Parents are encouraged to contact their children's schools to learn more details about the school's protective action plan PRIOR to any emergency situation. Contacting the school by telephone during an emergency is NOT recommended. Parents are encouraged to listen to radio and television news reports for more information.

B. Nursing/Group Homes

1. State law requires appropriate emergency action plans be maintained on site. It is very likely extra manpower and

ambulances will be required to deal with a situation involving the evacuation of a nursing home.

2. The elderly are extremely sensitive to temperature extremes.

3. Many group home residents may not possess the mental capacity to follow evacuation instructions. Working with group home personnel is crucial to maintaining an orderly atmosphere.

4. Maintaining a detailed list of full names and current whereabouts of ALL evacuees and maintaining constant communication with the Incident Commander and the Public Information Officer will prevent panic and hysteria among families and loved ones of the evacuees.

C. Correctional Facilities

1. Health and welfare of inmates are the responsibility of the jurisdictional law enforcement agency. Emergency and protective action plans are required to be maintained and kept on site.

2. These situations would require an extreme situation and a large amount of law enforcement resources to successfully implement an evacuation.

D. Disabled Populations

1. Businesses employing visually or mobility impaired employees are required to maintain and store emergency plans on site. Many of these plans call for an organized, orderly evacuation using buddy systems and other group cohesive strategies.

2. Maintaining a complete roster of evacuees and constant contact with the IC and Public Information Officer will reduce panic and hysteria among the families and loved ones of the evacuees.

TRAINING PROGRAMS

A. Public Sector – Each response agency within the Public Sector is governed by OSHA/IDOL standards on training.
B. Private Sector – Sara Title III facilities must train personnel to the level of knowledge necessary to perform their duties, and never assign duties for which personnel have not received proper level of training.
C. Available Programs
D. Current Training Status

    a. Awareness Level
    b. Operations Level
    c. Technician Level
    d. Incident Command Level