

5.0 Emergency Response

5.1. Emergency Response Plan

5.1.1. General

The U.S. Code of Federal Regulations (CFR) provides directives for site-specific emergency plans in 29 CFR 1910.120 (q). See regulatory text for details.

(1) Elements of an emergency response plan. Federal requirements dictate that employers subject to this requirement develop an emergency response plan that shall address, at a minimum, the following items to the extent that they are not addressed elsewhere:

- (i) Pre-emergency planning and coordination with outside parties.
- (ii) Personnel roles, lines of authority, training and communication.
- (iii) Emergency recognition and prevention.
- (iv) Safe distances and places of refuge.
- (v) Site security and control.
- (vi) Evacuation routes and procedures.
- (vii) Decontamination.
- (viii) Emergency medical treatment and first aid.
- (ix) Emergency alerting and response procedures.
- (x) Critique of response and follow-up.
- (xi) PPE and emergency equipment.

Additional Items for Emergency Response Plans

The following items may also be included or considered as part of emergency response planning. Depending on specific circumstances, the following alternative or additional items may be considered when developing an emergency response plan:

- Key company personnel evaluate the feasibility of including alternate personnel and how to contact those individuals if the need arose (e.g., phone, pager). Automatic pager calls and phone ring-down systems are available and may be helpful especially

where large numbers of people must be contacted quickly.

- Key outside personnel may be contacted directly or by automatic ring-down, and messaging systems may be incorporated to speed the process and document that the calls were made.
- Titles of individuals as they function in Emergency Response activities and their associated duties before, during and after the emergency can be explained in the plan.
- A description of the facility, layout and chemical inventory will aid in communicating with outside agencies and mutual aid groups.
- Preplanning the location and staffing of the incident command team, management and staging area(s), including a possible location offsite should a catastrophic emergency arise, can facilitate response actions.
- Companies have found it beneficial to have training and drills simulate real situations and have personnel trained to act as if the activity was not a mere preparation exercise. Drills have included the actual use of respirators including escape respirators. Smoke bombs have been used to make drills more realistic and to display air patterns.
- Alarm systems have included directional sirens, strobes or public announcement systems, and local annunciation systems. Evaluate whether alarm systems have sufficient volume to reach all affected personnel
- Consider utilizing suitable back-up systems for emergency response systems. For example, you might consider utility systems, communication devices, and emergency shut-down equipment.
- Evacuation/Shelter-in-Place: Establishing procedures that include communication equipment **INSIDE** the

safe shelter in the event it becomes necessary for persons to evacuate the safe shelter or for occupants to communicate information back to the On Scene Incident Commander (OSIC). Escape respiratory protection should be considered and made available for shelter areas in the event that evacuation is needed. This can include for example: the 5 minute escape type or the NIOSH approved mouth bit type respirators.

- Downwind or perimeter monitoring has been used to help better draw boundaries for personnel protection. Detection instruments help to determine when concentrations have dropped and the “all clear” can be safely given. Consideration may be given to any structures downwind that are or could be occupied by personnel. Phosgene can become “trapped” in buildings, where it dissipates slowly. Keep in mind that IDLH conditions will affect the staffing requirements for the downwind/perimeter monitoring person(s).
- Personnel and PPE decontamination procedures have been included in emergency plans. Before removing PPE, the use of badges or direct reading phosgene analyzers helps evaluate whether phosgene is present.
- Given the frequency of personnel turnover at hospital emergency rooms, addressing medical procedures for offsite personnel can be useful. Procedures for medical transport may include Phosgene Material Safety Data Sheets, the current version of the American Chemistry Council “Phosgene, Information on Options for First aid and Medical Treatment,” or other information on treatment.
- Companies have found it is useful that incident and drill critiques can generate action items that can be resolved in a timely manner.
- When developing written plans consider past incidents, near misses and credible emergency situations that could arise. A detailed plan for

phosgene may be incorporated into the general site emergency plan. Other practices that benefit response plans include: familiarizing all employees in the phosgene process with the plan; reviewing the plan on a periodic basis; and training the plant emergency responders to handle phosgene emergencies.

- Community standards (e.g., Emergency Response Planning Guides (ERPG's) and Acute Exposure Guideline Levels (AEGL's)) are also potentially relevant to Emergency Response Plans.

Emergency Response Planning Guides (ERPG)

ERPG's are values developed by the American Industrial Hygiene Association Emergency Response Planning Committee to assist emergency response personnel planning for catastrophic chemical releases to the community.

ERPG-1 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing anything other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.

ERPG-2 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

ERPG-3 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

The current AIHA ERPG values for phosgene can be found on the AIHA website at <http://www.aiha.org>.

Acute Exposure Guideline Levels (AEGL's)

The National Advisory Committee for the Development of Acute Exposure Guideline Levels for Hazardous Substances (AEGL Committee) develops guidelines to help both national and local authorities, as well as private companies, deal with

emergencies involving spills, or other catastrophic exposures.

AEGL's represent ceiling exposure values for the general public and are applicable to emergency exposure periods ranging from less than 1 hour to 8 hours.

AEGL 1 is the airborne concentration (expressed as ppm and mg/m^3) of a substance at or above which it is predicted that the general population, including "susceptible" but excluding "hypersusceptible" individuals, could experience notable discomfort. Airborne concentrations below AEGL 1 represent exposure levels that could produce mild odor, taste or other sensory irritations.

AEGL 2 is the airborne concentration (expressed as ppm and mg/m^3) of a substance at or above which it is predicted that the general population, including "susceptible" but excluding "hypersusceptible" individuals, could experience irreversible or other serious, long-lasting effects or impaired ability to escape.

AEGL 3 is the airborne concentration (expressed as ppm and mg/m^3) of a substance at or above which it is predicted that the general population, including "susceptible" but excluding "hypersusceptible" individuals, could experience life-threatening effects or death.

The current AEGLs values for phosgene can be found on the EPA website at <http://www.epa.gov/oppt/aeql/>.

5.1.2. EPA's Integrated Contingency Plan Guidance ("One Plan")

An Emergency Response program for sources subject to the requirements is required under 40 CFR Part 68. Compliance with other Federal contingency plan regulations or consistency with the EPA's "One Plan" is also discussed in this Part. (See below).

Subpart E-Emergency Response.

Source: 61 FR 31725, June 20, 1996, (effective date Aug. 19, 1996) unless otherwise noted.

§ 68.90 *Applicability.*

(a) *Except as provided in paragraph (b) of this section, the owner or operator of a stationary source with Program 2 and Program 3 processes shall comply with the requirements of § 68.95.*

(b) *The owner or operator of a stationary source whose employees will not respond to accidental releases of regulated substances need not comply with § 68.95 of this part provided that they meet the following:*

(1) *For stationary sources with any regulated toxic substance held in a process above the threshold quantity, the stationary source is included in the community emergency response plan developed under 42 U.S.C. 11003;*

(2) *For stationary sources with only regulated flammable substances held in a process above the threshold quantity, the owner or operator has coordinated response actions with the local fire department; and*

(3) *Appropriate mechanisms are in place to notify emergency responders when there is a need for a response.*

§ 68.95 *Emergency Response Program.*

(a) *The owner or operator shall develop and implement an emergency response program for the purpose of protecting public health and the environment. Such programs shall include the following elements:*

(1) *An emergency response plan which shall be maintained at the stationary source and contain at least the following elements:*

(i) *Procedures for informing the public and local emergency response agencies about accidental releases;*

(ii) Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures; and

(iii) Procedures and measures for emergency response after an accidental release of a regulated substance.

(2) Procedures for the use of emergency response equipment and for its inspection, testing and maintenance;

(3) Training for all employees in relevant procedures; and

(4) Procedures to review and update, as appropriate, the emergency response plan to reflect changes at the stationary source and ensure that employees are informed of changes.

(b) A written plan that complies with other Federal contingency plan regulations or is consistent with the approach in the National Response Team's Integrated Contingency Plan Guidance ("One Plan") and that, among other matters, includes the elements provided in paragraph (a) of this section, shall satisfy the requirements of this section if the owner or operator 1233 also complies with paragraph (c) of this section.

(c) The emergency response plan developed under paragraph (a)(1) of this section shall be coordinated with the community emergency response plan developed under 42 U.S.C. 11003. Upon request of the local emergency planning committee or emergency response officials, the owner or operator shall promptly provide to the local emergency response officials information necessary for developing and implementing the community emergency response plan.

5.1.3. EPA's Risk Management Program (RMP)

Risk Management Programs (if applicable) regulated under Environmental Protection Agency's Clean Air Act should be considered in emergency planning.

Phosgene is a regulated RMP chemical if stored above the threshold planning quantity of 100 pounds.

5.1.4 OSHA's HAZWOPER and Process Safety Management of Highly Hazardous Chemicals (PSM).

Requirements for emergency response planning for phosgene are also found in the OSHA rules governing Hazardous Waste and Emergency Response (HAZWOPER 29 CFR Part 1910.120) and the OSHA Process Safety Management of Highly Hazardous Chemicals (29 CFR Part 1910.119).

Phosgene is a regulated PSM chemical if stored above the threshold planning quantity of 100 pounds.

5.2. Fire

Phosgene is nonflammable. At temperatures above 250°C (482°F), phosgene decomposes to form mixtures of carbon monoxide (CO), chlorine (Cl₂), carbon dioxide (CO₂) and carbon tetrachloride (CCl₄). In the presence of oxygen, the carbon monoxide may burn to form carbon dioxide.

In case of fire and in the absence of phosgene leaks, the removal of cylinders from the fire zone and immediately shutting off phosgene sources can reduce some potential risks. When containers cannot be moved and if no phosgene is escaping, water can be sprayed on containers and piping to keep them cool.

Vessels and piping containing phosgene can be cooled with water spray. In such cases, cooling may be imperative because boiling of the phosgene and subsequent explosion of the vessel could create an extremely hazardous situation.

In case of fire and if only gaseous phosgene is leaking, water can be sprayed on containers and piping to keep them cool. Water applied to the point of leak may cause enlargement of the leaking opening because of corrosion. Consider removing cylinders from the fire zone if possible and shutting off phosgene sources immediately. Water fog may not be very effective in neutralizing phosgene vapor, but can help reduce concentration in the air. Aqueous ammonia spray may be more effective in neutralizing phosgene vapor, but use with caution due to hazards associated with breathing high concentrations of ammonia.

The selection of sprinkler systems, firewater monitors or portable firewater supplies is based on factors including the quantity of

phosgene and the requirements of the insurer and local fire marshal. Structural fireproofing where phosgene is stored, piped and used may affect the requirements.

In case of fire associated with phosgene, it may be critical to keep all authorized persons upwind a safe distance from the phosgene area and all other personnel evacuated from the area. Firefighting personnel may need respiratory protection. For additional information on respiratory protection, see Section 4.

5.3. Gaseous Leaks

As soon as there is any indication of phosgene present in the environment, immediate steps to evaluate include stopping the release of gas/liquid and simultaneously protecting personnel downwind, including the community. Indication of phosgene's presence in the environment may come from personnel or area monitoring systems, process control indicators or other sources. Authorized, trained personnel equipped with suitable protective equipment can conduct an evaluation. Where appropriate, it is prudent to assume that Immediately Dangerous to Life and Health (IDLH) conditions exist when responding to emergencies. An excerpt taken from 29 CFR 1910.134(g)(3) (OSHA Respiratory Protection Standard, revised 1998), lists the following requirements:

(3) Procedures for IDLH atmospheres. For all IDLH atmospheres, the employer shall ensure that:

(i) One employee or when needed, more than one employee is located outside the IDLH atmosphere.

(ii) Visual, voice or, signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

(iii) The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.

(iv) The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.

(v) The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation.

(vi) Employee(s) located outside the IDLH atmospheres are equipped with:

(A) Pressure demand or other positive pressure SCBA's or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA and either

(B) Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry or

(C) Equivalent means for rescue where retrieval equipment is not required under paragraph (g)(3)(vi)(B).

If the leak or spill is extensive or uncontained, sounding an evacuation alarm and warning all persons in the path of the gas helps prevent further concerns. Pre-arranged meeting points, crosswind or upwind, can be planned and used in practice to help ensure everyone is accounted for. Gaseous phosgene often lies close to the ground because it is heavier than air. Wind socks and instrumentation indicating wind speed and direction can provide important information for communication to those in the immediate area.

Notify relevant regulatory and community organizations as appropriate.

The use of Safe Shelters sometimes can provide a safer alternative to evacuation. These designated buildings can provide greater safety by constructing them to be relatively air-tight and under positive pressure, assuming the air intake is in a phosgene-free area or can be filtered. These locations may be labeled, and direction given to occupants about procedures to follow when the Safe Shelter is downwind as well as upwind. Persons entering a Safe Shelter DOWNWIND of a release have been known to contaminate the building with phosgene.

Anyone critical to the orderly shutdown of a process system that could be downwind of the release, may require respiratory protection. See Section 4 for further information.

Persons can reduce potential risks by staying upwind of the leak or spill keeping in mind potential responsibilities as part of the

emergency response team. 29 CFR 1910.120 gives direction as to what constitutes normal job duties and the point where the event has escalated to a full emergency. This is a critical decision left to the evaluation of the On Scene Incident Commander. The use of the “buddy” system is required for IDLH concentrations per 29 CFR 1910.134(g)(3).

5.4. Liquid Spills

In case of fire and if liquid phosgene is leaking, firefighting foams have been used to cover the liquid spill until disposal. Use water for firefighting with caution so as to avoid adding water to the liquid pool if at all possible. Liquid phosgene reacts slowly with water to form carbon dioxide and hydrochloric acid. The heat of reaction increases the vaporization rate of the liquid phosgene and therefore may increase the potential hazard to personnel. Subject to such issues and depending on overall circumstances, it still may be useful to spray containers with water to keep them cool.

All of the OSHA requirements and considerations for handling gaseous phosgene leaks also apply for liquid phosgene spills.

5.5. Mutual Aid

Industrial plants in one vicinity can help one another by establishing plans and an organization for rendering mutual aid in the event of an emergency or disaster such as phosgene spill or a fire. As part of these efforts, making mutual aid organizations thoroughly aware of the presence of phosgene in a facility facilitates proper response and training. Staging areas (including alternates) may be designated during the planning stage.

Phosgene emergency procedures that may involve persons outside the plant can be incorporated in Mutual Aid Instructions and Public Department Procedures (see Section 5.6).

Written provisions may be included in a Mutual Aid-Private Industry Agreement to allow for reimbursement for damages.

5.6 Offsite Release Planning

Preplanning for offsite releases of phosgene is critically important. Integration of site emergency response plans with public and private entities in the vicinity of the facility are useful for fast and effective response to an offsite release. Considerations in preplanning include:

- Identification of planning zones
- Communications & notification
- Sheltering in place
- Evacuation planning
- Consideration of assembly areas in the planning zones
- Emergency medical treatment
- Emergency information on phosgene.

Identification of zones that may be impacted in the event of a phosgene release should be identified so that emergency response pre-planning can be performed. The EPA RMP worst case and alternate release scenario's for phosgene are useful planning tools.

In the event of an actual or potential off site release of phosgene, the means of communication and notification are critical. Identify means of immediate notification of the authorities and the areas impacted to quickly alert potentially affected parties. Evaluate means to communicate with the public and employees families like using press releases, existing phone systems, or emergency information systems established by the company (Emergency information hot lines).

Rapid notification to potentially affected parties can insure proper sheltering in place or evacuation to minimize the impact of an offsite release. Consider utilizing the local Emergency Alert System (EAS) in place, automated phone dialing systems such as the Community Alert Network or reverse 911, and the use of community alert sirens when appropriate.

Sheltering in place of residents and other potentially affected parties can be one of the most effective means of minimizing the impact of an offsite release. Consider procedures that are in place and rehearsed to insure effective implementation. Evacuation plans and drills are a good method to insure quick and effective implementation.

Pre-planning with areas where large numbers of people may congregate in the planning zones is imperative to effective and quick response. Work with local emergency responders to identify these areas and address notification, sheltering and evacuation plans.

Coordinate first aid and medical treatment of people affected by an offsite release with the local hospitals and EMS personnel. Use of

the phosgene panel's guidance titled, "Phosgene, Information on options for First aid and Medical Treatment, current version," may be helpful for this coordinated response planning.

www.americanchemistry.com/phosgenepanel.

Make emergency information for phosgene readily available for 1st responders, the media, and people affected by the release. One available resource is the ATDSR phosgene fact sheet found at <http://www.atsdr.cdc.gov/tfacts176.html>.