NATURAL GAS EMERGENCIES

PURPOSE

Natural gas (Methane) is extremely flammable, lighter than air, is colorless and odorless. Due to these characteristics, Mercaptan is added to natural gas to help indicate its presence and will result in an odor similar to rotten eggs. The flammable range of natural gas is 4 percent gas in atmosphere/ Lower Explosive Limit (LEL) to 15 percent gas in atmosphere/ Upper Explosive Limit (UEL) by volume. Although natural gas is non-toxic, it can displace oxygen, which can cause asphyxiation in certain environments. The presence of natural gas in its flammable range can be evaluated with the use of a Combustible Gas Indicator. This is done by the Hazardous Materials Response Teams (HMRT) and/or the appropriate utility company.

Fires involving natural gas should be controlled by stopping the flow of gas. In most cases, burning natural gas should not be extinguished with water, as this would change the situation from a visible to an invisible hazard. Natural gas is lighter than air, if confined it has the potential for a catastrophic explosion. Natural gas leaks above ground are easier to manage than below ground leaks.

PROCEDURE

Fire Department units may encounter natural gas in a variety of situations and incident types, each presenting a unique set of hazards. These incidents can range from a simple check odor to potential major incidents involving natural gas explosions. The following guidelines present an approach which will be applicable in many situations, but do not replace good judgment and experience when dealing with any incident. Incidents involving natural gas should be managed using the risk management profile and strategic decision-making model (M.P. 201.01C).

Personnel Safety

Per M.P. 202.05B; Self Contained Breathing Apparatus, all personnel working in the vicinity of a potential explosion or fire area, including gas leaks and fuel spills, shall wear full protective clothing with SCBA, face piece donned and breathing air. A Hot Zone shall be established and defined by "fire line" tape. Personnel working

in the hot zone, (e.g. attempting to secure a gas leak), shall be protected by a hose line. The number of exposed personnel will be kept to a minimum while still assuring crew accountability and a minimum of two personnel.

Actions of The First Arriving Fire Department Unit (Non Haz-Mat)

- Perform a scene size-up and establish Command. Consciously avoid committing apparatus or personnel to a dangerous situation or one that has the potential to become unsafe due to gas migration.
- Attempt to locate the homeowner or responsible party (RP) and begin gathering information about the hazard, potential victims, and any other relevant details.
- **Evacuate** the area as needed, based on the potential size of an explosive event. When in doubt, expand the evacuation area and Hot Zone to ensure safety. Work toward an "All Clear" of the immediate area and surrounding structures if necessary.
- **Isolate** the area/scene – Establish the Hot Zone using Hazard Zone tape or other clear physical barriers.
- **Deny entry** to all unauthorized personnel.
- All crews operating in the Hot Zone must follow strict safety protocols, including wearing full PPE with SCBA, face piece donned and breathing air—no exceptions.
- Consider establishing a water supply and coordinate the location of a charged hoseline with Safety and Hazard Sector to determine the most effective and safe placement.
- The charged hoseline must be attended by a RIC team in full PPE and SCBA, face piece donned and breathing air, whenever HMT crews or gas company personnel are working in the Hot Zone.

Actions Of the First Arriving Haz-Mat Unit

- First arriving Hazardous Materials Response Team should be assigned Hazard Sector
- Ensure that firefighter safety practices are in place when working in the Hot Zone, including wearing the appropriate PPE with SCBA face piece donned and breathing air.

- Ensure that a charged hose line is in place and manned when Haz-Mat crews or gas company personnel are securing the leak.
- Contact initial crews, the RP, and gas company personnel (if on scene) to gather information about the hazard.
- Reevaluate the initial Hot Zone using metering devices, including Combustible Gas Indicators (CGI), and adjust the boundaries as necessary based upon the situation and meter readings.
- Gather necessary tools and equipment needed to mitigate the hazard.
- In situations where gas company personnel are needed to assist with the mitigation efforts, ensure that they are dressed in the appropriate PPE including SCBA's.

Incidents Involving a Reported Gas Leak – No Fire or Explosion

Calls for "odor of gas," "gas leak," "broken gas line" and similar situations may range from minor to major incidents. Each of these scenarios should be approached as potentially dangerous situations. Although there is not a visible hazard, fire or explosion, the situation can change instantly. Uncontrolled flammable gas leaks should never be approached with a "routine" mindset. Safe and effective operations require appropriate size up, approach, establishing and controlling the perimeter, and hazard mitigation.

In all cases, Fire Department units shall take appropriate actions, using the Risk Management Profile (M.P.201.01c) to provide for life safety and property conservation.

If gas company personnel are on the scene of an incident prior to arrival of fire crews, the best practice is for the first arriving Fire Department unit to make contact with the on-scene gas company and determine needs. Gas company personnel and the Hazardous Materials Response Team shall obtain a sufficient number of gas concentration readings, using various tools, including combustible gas indicators for Command to evaluate the hazard and take appropriate action.

The Hazardous Materials Plan (M.P. 204.01) should be used as a basic guide for these incidents. A minimum number of personnel should be allowed to enter the

area to size- up the situation while any additional unit's stage outside the hazard zone, preferably up wind of the incident.

In addition to evacuating, isolating, and denying entry, non-tech fire crews can secure gas services to devices or buildings.

- If the location of the incident is a **SINGLE-FAMILY DWELLING** it would be appropriate to secure the gas at the meter if deemed necessary.

- If the location of the incident is at an **APPARTMENT COMPLEX, COMMERCIAL OCCUPANCY, OR OTHER LARGE OCCUPANCY** (e.g. large warehouses, hospitals, etc.), securing the gas at the main is often difficult to accomplish due to the size and complexity of the building or buildings Best practices should include evacuation, isolation, and the denying entry until Haz-Mat crews and/or gas company personnel arrive on scene.

Gas leak situations within a building where the source of the leak is unknown or uncontrolled, the gas supply should be shut off at the meter if safe to do so.

Attempting to secure ignition sources, e.g. turning off power, can lead to an explosion. Securing electricity may take place at a remote location. Fire Department members should work with utility companies to secure ignition sources, including electricity, remotely.

First arriving Hazardous Materials Response Team (HMRT) should be assigned Hazard Sector and should initiate metering the area to re-evaluate the established Hot Zone boundaries. Hazard Sector will assess their ability to mitigate the leak. Hazard sector should consider ventilating the structure using natural ventilation and/or intrinsically safe equipment if available. Battery operated equipment does not necessarily mean intrinsically safe.

Hazard Sector should work with the gas company to obtain a sufficient number of gas concentration readings in the event the leak has not been identified. If gas company personnel are actively securing the leak in the HOT ZONE, fire department crews shall provide stand-by protection with a charged 1 ¾" hand line

and minimum of two firefighters in appropriate PPE with SCBA, face piece donned and breathing air. Haz Mat team members shall be on scene and work directly with the gas company anytime their crews are operating in the hot zone.

Operating personnel should remain pessimistic in their approach to reported gas leaks and should utilize Hazardous Materials crews and utility company resources to rule out any potential hazards.

Incidents At Which An Explosion Or Fire Has Occurred

Units arriving at the scene of a structural explosion must consider natural gas as a possible cause and recognize the potential signs including a debris field, and/or structural damage.

Explosions have occurred in structures which were not served by natural gas. Underground leaks may migrate considerable distances before entering a structure through the foundation, around pipes, or through void spaces. When natural gas migrates in this manner, Mercaptan may be scrubbed as the gas travels underground leaving the gas truly odorless. In these circumstances, the cause of the explosion may be difficult to determine.

First arriving crew should perform the following:

1. Effective size up, recognize the signs of a gas explosion.
2. Determine the presence of victims, their condition, and triage.
3. Identify immediate hazards (e.g., collapse, leaking gas, fire, etc.).
4. Request additional resources based up the situation found and the hazards present.
5. Develop an incident action plan, consideration given to the need for rescue of trapped occupants, structural collapse and/or integrity, treatment, fire control, etc. Also, address accomplishment of an "All Clear" on involved structure and surrounding structures (evacuation).

Until it can be determined that the area is safe from the danger of further explosions, evacuate all civilians and keep the number of Fire Department and/or other emergency personnel (e.g., gas company) in the area to the minimum number necessary to stabilize the situation. Take a pessimistic point of view.

The Incident Commander must establish a Hazard Sector as soon as possible. Hazard Sector should establish Hot, Warm, Cold, and No-Entry Zones as necessary. The Hot Zone should include any areas where gas detection equipment identifies reading of 10 % of the LEL (0.4% gas) or greater. If a gas concentration is encountered inside, adjacent to, or underneath any building, secure all possible sources of ignition in the affected area. HazMat crews will, in coordination with utility company personnel, secure electricity from outside the affected area to avoid arcing if necessary. Before securing any potential ignition source, evaluation and metering of the area should take place. Hazard Sector should consider ventilating the structure using natural ventilation and/or intrinsically safe equipment if available. Battery operated equipment does not necessarily mean intrinsically safe.

Use combustible gas indicators to systematically check all suspected areas. Start outside of the area of the explosion and move into the area until readings indicate a detectable concentration. Both gas company personnel and the HMRT will establish hot and warm zones.

The use of ground probes is essential to evaluate potential underground leaks. However, in extraordinary circumstances, such as migration of gas in a sewer system, ground probes may not be sufficient and other detection devices may be required. When gas company personnel are on the scene, ground probe readings and locations must be coordinated with the on-scene HMRT units.

Command shall provide for effective interaction between gas company personnel and the Fire Department. Gas company personnel are responsible for locating and eliminating leaks in the gas system. As industry specialists, they can provide Command with valuable assistance in the effective handling of these incidents. In all cases, C957 or a Haz Mat Company Officer, will be required to supervise during on-site operations.

Command must ensure the safety and stability of all involved structures. If further collapse is possible and a life safety hazard exists, Technical Rescue Teams and other specialty resources should be called to provide for structural stabilization.

Additional appropriate resources should be requested as needed. (e.g., C99 should be dispatched and structural engineers requested if necessary).

High Pressure Regulator Stations

High Pressure Regulator Stations can be found throughout the Phoenix Valley, typically in high visibility/easy access locations. Regulator stations are often located at large intersections, or on the perimeter of a residential neighborhood. These regulator stations reduce natural gas line pressure from transmission levels (400-800+ psi) to distribution levels (30-60 psi). Regulator stations will typically be surrounded by large concrete bollards and will have an associated regulator station number located on either a bollard, or on the piping itself.

NO FIRE DEPARTMENT MEMBER (INCLUDING HAZARDOUS MATERIALS TECHNICIANS) SHALL ATTEMPT TO CLOSE, ADJUST, OR TAMPER WITH ANY VALVES OR FITTING AT ANY REGULATOR STATION.

If any fire department unit responds to a call at a suspected regulator station, it is best practice to evacuate the area, establish a limited access zone, and deny the entry of any personnel. Members should notify the on-duty C957 directly that the incident involves a high-pressure regulator station so proper gas company units are called to the scene. Regulator stations require the response of specialized gas company personnel, as most gas company workers are not trained or capable of mitigating regulator station emergencies.

Close out of a Natural Gas incident

After mitigating a release or confirming that one has not occurred, the incident must be closed by properly transferring the scene over to a Southwest or City of Mesa Gas technician (these are the only two utilities providing service to the region) by a Fire Department Company Officer or Battalion Chief. A HMRT member is preferred, but this preference is dependent upon the extent of the incident and the current number of HMRT's that are available. The only exception to this is an "odor of Natural Gas" at a single-family dwelling with no gas or leak found that was confirmed with the appropriate detection devices by HMRT crews. Under these circumstances, an HMRT Company Officer may make direct contact

with Southwest or City of Mesa Gas on a recorded phone line through the alarm room. They must provide the dispatcher/TRO with the following information,

- Fire department unit ID number
- Name and contact number of Hazmat captain making the phone call
- Address of incident and incident number
- Incident type and initial findings of crews
- Any investigation or meter reading information
- Status of the Natural Gas meter (on or off)
- Any necessary RP contact information

Advise RP that a Southwest or City of Mesa Gas technician is enroute and give them an ETA. All occupants are allowed to go back inside their residence.

All crews may assemble and go available after this report to SWG.